SPU AGREEMENT NO. 22-048-A

MEMORANDUM OF AGREEMENT

BETWEEN
THE CITY OF SEATTLE
AND
THE STATE OF WASHINGTON, DEPARTMENT OF FISH AND WILDLIFE
FOR
SOCKEYE HATCHERY OPERATIONS AT LANDSBURG ON THE CEDAR RIVER

THIS MEMORANDUM OF AGREEMENT ("**Agreement**") is made by and between The City of Seattle a municipal corporation of the State of Washington, acting through its Seattle Public Utilities Department (hereinafter the "**City**" or "**SPU**"), and the State of Washington, by and through its Department of Fish and Wildlife ("**WDFW**"). SPU and WDFW may be referred to herein collectively as the "**Parties"** and individually as a "**Party**".

RECITALS

WHEREAS, the Cedar River has been the primary source of water supply for The City of Seattle (City) and neighboring communities for over one hundred years; and

WHEREAS, the Cedar River Municipal Watershed and the lower Cedar River are home to many species of fish and wildlife, some of which are listed as endangered or threatened under the Endangered Species Act; and

WHEREAS, The City's water supply system relies on the Landsburg Diversion Dam to access water from the Cedar River; and

WHEREAS, the Landsburg Diversion Dam was built in the early 1900's with no provisions for anadromous fish access to the upper Cedar River; and

WHEREAS, Seattle City Council Ordinance 115204 directed the Superintendent of Water to negotiate and submit to the Council a comprehensive settlement agreement with the Washington Department of Fisheries, the Washington Department of Wildlife, the National Marine Fisheries Service, U.S. Fish and Wildlife Service and the Muckleshoot Tribe detailing the mitigation requirements for the Landsburg Diversion for salmon and steelhead; and

WHEREAS, Seattle City Council Resolution 29657, 29977, and 30091 instructed the Director of Seattle Public Utilities to prepare a Habitat Conservation Plan for the Cedar River Watershed including an Instream Flow Agreement for the Cedar River and a Mitigation Agreement for the fish migration blockage created by the Landsburg Diversion Dam; and

WHEREAS, Seattle City Council Resolution 30168 directed the Director of Seattle Public Utilities to implement the Cedar River Watershed Habitat Conservation Plan including the Instream Flow Agreement for the Cedar River and the Landsburg Mitigation Agreement; and

WHEREAS, the Washington Department of Fish and Wildlife (WDFW), the City , the National Marine Fisheries Services (NMFS) and the U.S. Fish and Wildlife Service (USFWS) signed the Cedar River Watershed Habitat Conservation Plan and associated agreements, including the Landsburg Mitigation Agreement, that established the City's long-term commitments regarding watershed habitat protection and restoration and mitigation for impacts resulting from the presence and operation of certain City-owned facilities, all in exchange for certain releases and settlement of various water resource management issues with the other parties; and

WHEREAS, the Landsburg Mitigation Agreement directs the City to fund, among other facilities and activities, the construction, operation, monitoring and adaptive management of a new Sockeye Salmon Hatchery at Landsburg which is scheduled to begin operations in the late summer of 2011; and

WHEREAS, Seattle City Council Ordinance 122131 authorized the Director of Seattle Public Utilities to implement all terms of the 2006 Settlement Agreement between the Muckleshoot Indian Tribe and the City; and

WHEREAS, the 2006 Settlement Agreement between the Muckleshoot Indian Tribe and the City directs the City to implement the terms of the Landsburg Mitigation Agreement with special reference to the expeditious and effective construction and operation of the new Sockeye Salmon Hatchery at Landsburg; and

WHEREAS, the City, the WDFW, the USFWS, the NMFS and the Muckleshoot Indian Tribe recognize the need for effective operation of the sockeye mitigation hatchery pursuant to the Landsburg Mitigation Agreement; and

WHEREAS, the WDFW operates over 80 fish hatcheries in the State of Washington, is the current operator of the Interim Landsburg Sockeye Hatchery under agreement with the City and is experienced and established in sockeye hatchery operations on the Cedar River; and

WHEREAS it will be mutually advantageous to WDFW and the City to have an Agreement that clarifies the administrative and operational details of the Habitat Conservation Plan and Landsburg Mitigation Agreement with respect to the operation of the new Sockeye Hatchery at Landsburg and directs WDFW to operate the new Sockeye Hatchery at Landsburg; and

WHEREAS, since 2000 and consistent with the Landsburg Mitigation Agreement, the City has provided the WDFW funding for the operation of the Cedar River Sockeye Hatchery and brood stock collection facility through a series of one-year agreements; and

WHEREAS, in the operation of the Sockeye Hatchery at Landsburg, the City and the WDFW seek to achieve cost savings to both Parties by leveraging shared resources and exploring alternative resource acquisition pathways; and

WHEREAS, both the City and the WDFW have demonstrated a desire to have an agreement in place until the cost commitment of the Landsburg Mitigation Agreement has been met;

NOW, THEREFORE, in consideration of the mutual promises contained herein, the Parties agree as follows:

1. **EFFECTIVE DATE.** This Agreement shall be effective on October 1, 2022 ("**Effective Date**"), subject to the approval by the City by ordinance. Ordinance No. _____.

2. **TERM OF AGREEMENT.** The term of this Agreement shall become effective once it has been executed by all Parties and shall continue through June 30, 2025. The term may be extended by mutual agreement of the Parties for a negotiable number of years prior to the termination date. An Amendment, prepared in writing, to extend the term will be executed by both Parties if agreed to.

3. **SCOPE OF SERVICES.** WDFW shall perform the services described in **Attachment A** – Scope of Services and Schedule attached hereto and made a part of this Agreement (hereinafter the "**Project**", "**Work**' or the **Services')**. An annual notice to proceed shall be required from the SPU contract manager before work can proceed on July 1st each year (see **Attachment A-1**). Digital Materials: WDFW shall provide digital materials, including reports, data, maps, graphs and photos that are compatible with current Seattle Public Utilities file and data formats. All digital materials shall be the property of the City.

4. **BILLING AND PAYMENT.** Total compensation under this Agreement shall not exceed **$2,142,062** unless modified by a written amendment to this Agreement**.** WDFW shall submit invoices organized and consistent with **Attachment B**, Table B-3 (Monthly Invoice Tracking), on a monthly basis. SPU shall pay WDFW invoices within thirty (30) days of receipt of the invoice up to the total dollar amount, all in accordance with **Attachment B** – Terms of Invoicing and Payment, attached hereto and made part of this agreement and subject to Section 12. Final invoices for each fiscal year (July through June) shall be delivered to SPU no later than September 30 of the following year. WDFW shall make every reasonable effort to comply with this schedule, and SPU may dispute any previous year's expenses not reasonably invoiced by September 30.

    a. Upon expiration of this Agreement, any claim for payment not already made shall be submitted within 30 days after the expiration date or the end of the fiscal year, whichever is earlier.

5. **NO JOINT UNDERTAKING.** Nothing in this Agreement shall be construed to make or render the parties hereto partners, joint ventures or participants in any joint undertaking whatsoever.

6. **SCHEDULE.** The Parties shall comply with the schedule appearing in **Attachment A** – Scope of Services and Schedule. Compliance with the schedule is important to successful completion of the Project. The Parties shall promptly and regularly notify each other of any occurrences affecting the schedule and shall attempt to agree upon an amended schedule if necessary or appropriate, to be effective upon execution of an Amendment to this Agreement in accordance with Section 16. Notwithstanding the preceding sentence, failure to comply with the schedule shall constitute a Default and be grounds for termination of this Agreement.

7. **NO THIRD-PARTY BENEFICIARIES.** This Agreement is entered into solely for the mutual benefit of the Parties hereto. This Agreement is not entered into with the intent that it shall benefit either Party's agents, consultants or contractors and no such other person or entity shall be a third-party beneficiary of this Agreement.

8. **PUBLICATION.** Each Party may publish the results of the Project, and shall acknowledge each Party's respective role in and support of the Project. Each Party shall share draft publications and seek the other Parties' comments and approval prior to their release.

9. **OWNERSHIP.** All materials prepared or developed hereunder by WDFW or its employees, or subcontractors or their employees or agents, including documents, calculations, maps, sketches, designs, tracings, notes, reports, data, computer programs, models and samples, shall become the property of SPU when prepared, whether delivered to SPU or not and shall, together with any materials furnished WDFW and its employees by SPU hereunder, be delivered to SPU upon request, and, in any event, upon termination or final acceptance of the Services. WDFW agrees that all Work prepared by it, or its employees, agents or subcontractors of any tier, or their employees, under this Agreement which is subject to protection under copyright laws constitutes "**Work Made for Hire**," all copyrights to which belong to SPU. In any event, WDFW assigns to SPU all intellectual property rights in such Work whether by way of copyright, trade secret or otherwise, and whether or not subject to protection by copyright laws, details, specifications, computer software or other intellectual property. Such materials, and any materials such as drawings, reports or specifications necessary to the SPU's use, maintenance or repair or the Work, shall be licensed to the City, by a fully paid perpetual license, for its own use for the Services that are the subject of this Agreement to the fullest extent necessary to accomplish the purposes of this Agreement.

    a. WDFW may, upon request to SPU and subject to SPU's consent, retain copies of such material for furtherance of its professional knowledge.

    b. Should WDFW or its employees, officers, agents, subcontractors of any tier, or anyone of a like nature originate or develop any trade secret, discovery, improvement, idea, formula, process or invention in performance of the Work (collectively "**Invention**", such Invention shall be timely disclosed to SPU and shall be the property of SPU. WDFW hereby assigns to SPU all of its right, title and interest in such Invention. WDFW further agrees to execute all documents which SPU reasonably determines to be necessary or convenient for use in applying for, perfecting or enforcing patents or other intellectual property rights including, without limitation, the execution of any assignments, patent applications, or other documents which may reasonably be requested by SPU.

10. **SAFETY.** WDFW shall be responsible for being aware of and initiating, maintaining, and supervising compliance with all safety laws, regulations, precautions, and programs in connection with the performance of the Agreement. Prior to start of any Work required by this Agreement, WDFW shall assure that each of its own employees are fully trained concerning all safety, health, and special security regulations pertaining to their Work. The City has strict policies regarding the use of Background checks, criminal checks and immigrant status for contract workers. The policies are incorporated into the contract and available for viewing on-line at http://www.seattle.gov/business/WithSeattle.htm. (**Attachment C**). Given the critical nature and importance of the City's Municipal Water supply, WDFW shall be responsible to ensure all its employees are knowledgeable and fully comply with the Cedar River Municipal Watershed Access, Water Quality and Control Regulations (**Attachment D**). WDFW employees will comply with the responsibilities and obligations outlined in the Cedar River Sockeye Salmon Hatchery Residence Management Provisions (**Attachment E**).

    a. WDFW shall conduct all operations under this Agreement in such a manner as to avoid the risk of bodily harm to persons including the public or risk if damage to any property.

b. In the event WDFW fails to correct any violation of safety or health regulations within 30 calendar days, SPU may suspend all or any part of the Work. During the pendency of such correction WDFW shall take all prudent and reasonable measures to mitigate any hazard resulting from the violation. WDFW shall not be entitled to any extension of time or reimbursement for costs caused by any such suspension order.
Failure of SPU to order discontinuance of any or all of WDFW's operations shall not relieve WDFW of its responsibility for the safety of personnel and property.

c. WDFW shall maintain an accurate record and shall timely report to SPU all cases of property damages in excess of $100 and of death, occupational diseases, or injury to employees or any other third parties and incident to performance of Work under this Agreement. WDFW shall promptly notify SPU and provide a copy of any safety citation issued by any governmental entity.

11. **ENVIRONMENTAL.** SPU and WDFW have established environmental policies to prevent or reduce pollution by avoiding contamination of water, air, and land resources and to participate in waste reduction and recycling efforts. WDFW will comply with all applicable Federal, State and Local government laws and regulations. WDFW will have trained employees to perform their jobs in a safe and environmentally responsible manner. WDFW will inform SPU's representative of any hazardous material spills or other contamination that occurs on a work site. WDFW is responsible for maintaining control of all hazardous materials during use and for the proper storage of materials not in use.

12. **DISPUTES.** If a dispute arises out of or relates to this Agreement, the Parties agree to first use their reasonable best efforts to cooperatively resolve such dispute. SPU and the WDFW shall use their reasonable best efforts to resolve disputes arising in the normal course of business at the lowest organizational level between each Party's staff with appropriate authority to resolve such disputes. When a dispute arises between the SPU and the WDFW, which cannot be resolved in the normal course of business, each Party shall notify the other of the dispute, with a Notice specifying the disputed issues.

    a. SPU and WDFW coordinators shall use their reasonable best efforts to resolve the dispute within five (5) business days of submission by either Party to the other of such dispute notice. If SPU and WDFW coordinators are unable to resolve the dispute within a five (5) business day period, they shall immediately escalate the matter to the WDFW's Regional Director's Office with appropriate authority to resolve the dispute and the City's SPU Deputy Director's Office, who shall have ten (10) business days to resolve the dispute. If they are unable to resolve the dispute within ten (10) business days, they shall immediately escalate the matter to WDFW's and City's SPU Directors Offices. If the Directors are unable to resolve the dispute within fifteen (15) business days, either Party may pursue its available legal and equitable remedies. Either party may request an extension of the time periods noted in this section.

    b. WDFW and SPU agree that the existence of a dispute notwithstanding, they will continue without delay to carry out all their respective responsibilities under this Agreement that are not affected by the dispute.

    c. If the subject of the dispute is the amount alleged due and payable by SPU hereunder, WDFW shall continue providing the Work pending resolution of the dispute provided SPU pays WDFW the amount SPU, in good faith, believes is due and payable, and places

in escrow the difference between such amount and the amount WDFW, in good faith, believes is due and payable.

13. **RECORDS MAINTENANCE.** WDFW shall maintain books, records, documents and other evidence which sufficiently and properly reflect all direct and indirect costs expended by either Party in the performance of the services described herein. These records shall be subject to inspection, review or audit by the City. All books, records, documents, and other material relevant to this Agreement will be retained in accordance with Washington State law. The City shall provide reasonable notice when requesting access to records.

14. **IDEMNIFICATION.** To the extent permitted by Washington law, WDFW does hereby release and defend, indemnify and hold the City and its employees harmless from all losses, liabilities, claims (including claims arising under federal, state, or local environmental laws), costs (including attorney fees), actions or damages of any sort whatsoever arising out of the negligent conduct of WDFW employees while providing services under this Agreement (including all Services described in Attachment A – Scope of Services), but this indemnity shall not include an obligation to indemnify the City for the sole or concurrent negligent conduct of the City employees. WDFW waives any immunity it may have or limitation on the amount or type of damages imposed under any Industrial, Workers Compensation, and Disability, Employer Benefit or similar laws.

15. **INSURANCE.** The City recognizes that the WDFW is self insured as a Washington State governmental entity for tort liability. The city will maintain "all risk" (including earthquake and flood perils) Property Insurance or Self-Insurance on the Cedar River Sockeye Hatchery and appurtenant structures, including the residences specified in **Attachment E.,** for replacement value. WDFW shall not be liable for payment of City's Property Insurance deductibles except to the extent to which WDFW shall be responsible for damage causing loss. The City shall waive its insurer rights of subrogation in favor of WDFW. Should WDFW or any WDFW personnel elect to insure their respective business or personal property for Property Insurance, they shall waive their insurer's rights of subrogation and rights for recovery in favor of the City and its employees and agents. No coverage is provided under City Property Insurance or self-insurance for WDFW business property or the personal property of WDFW personnel. Whether WDFW business or WDFW personnel personal property is insured by them or not, all such property on City premises shall be at the sole risk of WDFW and WDFW personnel. No evidence of Insurance or Self-Insurance is required to be provided by either Party.

16. **AGREEMENT ALTERATIONS AND AMENDMENTS.** This Agreement may be amended by mutual agreement of the Parties. Such amendments shall not be binding unless they are in writing and signed by personnel authorized to bind each of the Parties.

17. **ASSIGNMENT.** This Agreement shall not be assigned in whole or in part by either Party without the prior written approval of the other Party.

18. **COMPLIANCE WITH THE LAW.** The Parties to this Agreement shall comply with all Federal, State, and Local laws and ordinances.

19. **TERMINATION.**

    a. **For Default.** Failure to keep or perform any term or condition of this Agreement shall be a default hereunder (a "**Default**"). Upon a Default, the aggrieved Party shall provide written notice to the defaulting Party, specifying th**e natur**e of the Default, and the aggrieved Party's intention to terminate this Agreement if the Default is not corrected within thirty (30) days of the date of the notice. If the defaulting Party fails to cure within the stated period, the aggrieved Party may thereafter terminate this Agreement without any further proceedings. The aggrieved Party will have available to it all remedies provided at law and equity.

    b. **By Notice**. Either Party may terminate this Agreement by providing 1 year written notice to the other Party.

20. **CITY ABILITY TO TERMINATE DUE TO LACK OF APPROPRIATIONS.** It is understood that funds for the payment of the services to be provided hereunder are allocated out of monies received by the City from tax sources and/or other governmental entities and that funding for the services to be provided hereunder may by decreased or eliminated by executive or legislative action. Therefore, the Parties agree that notwithstanding any other provision in this Agreement, if said funding is decreased or eliminated, or if in the judgment of the executive or legislative authority of the City, continuation of this Agreement would be an unnecessary expenditure of public funds, then the City may terminate this Agreement without further obligation to WDFW after the City has given WDFW written notice of such termination at least thirty (30) days prior to the effective date of termination and documentation of such executive or legislative action.

21. **SEVERABILITY.** If any provisions of this Agreement or any provision of any law, rule or document incorporated by reference into this Agreement shall be held invalid, such invalidity shall not affect the other provisions of this Agreement which legally can be given effect without the invalid provision. To this end, the provisions of this Agreement are declared to be severable.

22. **APPLICABLE LAW.** This Agreement shall be governed by and construed in accordance with the laws of the State of Washington. The jurisdiction and venue of any action brought hereunder shall be in the Superior Court of King County.

23. **AUDIT.** During the process of the Project and for a period of no less than three years from the Completion Date, each Party will keep and make available for each other's inspection and audit all records pertaining to the Project, including accounting records. The Parties shall furnish to each other copies of these records upon request and shall maintain the records in accordance with work order accounting procedures prescribed by the Division of Municipal Corporations of the State Auditor's Office.

24. **NOTICES.** All notices to the Parties of this Agreement shall be in writing and addressed to those persons identified in **Attachment B** – Terms of Invoicing and Payment.

25. **ENTIRE AGREEMENT.** This Agreement and any written attachments or Amendments thereto, constitutes the complete contractual agreement of the Parties and any oral representations or understandings not incorporated herein are excluded.

26. **PAYMENT FROM THE MANAGEMENT RESERVE FUND (IF ANY).** For a Management Reserve Fund to be utilized on this Agreement or any subsequent amendments it must already be identified on the associated **Attachment B** for the estimated cost. The Management Reserve Fund is to provide SPU with flexibility to authorize additional funds for allowable unforeseen costs beyond those estimated for in the tasks of the Scope of Work, or for reimbursing WDFW for additional work requested by the City toward completing the Scope of Work. If this Agreement has any Federal monies in it, the maximum amount allowable for the Management Reserve Fund shall not exceed the lesser of $50,000 or 10% of the total Agreement amount.

    a. Payment from the Management Reserve Fund is at the sole discretion of SPU and must be authorized in writing **before** WDFW performs the additional work. Such written authorization will include a description of the work that is to be performed and shall specify the amount of the payment, including, if applicable, any profit factor. Any fixed fee for work reimbursed from the Management Reserve Fund shall be negotiated at the time such work is assigned to WDFW and shall be authorized in writing by the City. WDFW shall show separately and identify on its invoices all charges against the Management Reserve Fund.

27. **OVERHEAD.** Except as provided in this section, or otherwise agreed, WDFW may charge overhead at the rate annually approved by the Federal Government established through the U.S. Department of Interior and may adjust the rate accordingly upon sixty (60) days notice to SPU. WDFW shall not charge an overhead rate for the purchase of fish food, capital outlay expenditures, or the purchase of equipment. The Parties agree that SPU has not relinquished any ability to request a waiver of or reduction of overhead. Nothing in this paragraph precludes a Party from requesting a discussion about changes to or a waiver of the overhead rate.

(SIGNATURE PAGE)

IN WITNESS WHEREOF, in consideration of the terms, conditions, and covenants contained herein, or attached and incorporated and made a part hereof, the parties have executed this Agreement by having their representatives affix their signatures below.

SEATTLE PUBLIC UTILITIES (SPU)	**WASHINGTON STATE DEPARTMENT OF**
THE CITY OF SEATTLE	**FISH & WILDLIFE (WDFW)**
	THE STATE OF WASHINGTON
_____	_____
Andrew Lee, SPU General Manager/CEO	Kelly Susewind, WDFW Director
_____	_____
Date	Date

ATTACHMENTS SPU AGREEMENT NO. 22-048-A

A. Scope of Services and Schedule
   A-1 Annual Notice to Proceed
B. Terms of Invoicing and Payment
C. Seattle Public Utilities SAID Card Application and Background Check Authorization
D. Cedar River and South Fork Tolt Watersheds Water Quality and Protection Regulations
E. Cedar River Sockeye Salmon Hatchery Residence Management Provisions
F. Landsburg Mitigation Agreement
G. Cedar River Hatchery Program 2014 Strategic Plan
H. Cedar River Hatchery Adaptive Management Plan
I. Adaptive Management Work Group Charter and Operating Guidelines
J. Cedar River Sockeye Hatchery Maintenance Responsibility Assignment Table
K. WDFW Stand-by Rules
L. Facility Emergency Call Plan for the Cedar River Hatchery
M. Landsburg Fish Hatchery Spill Response Plan
N. Landsburg Power Outage SOP

Table B-1: Total budget, with annual estimates.

Brood year (starting Oct 1 to June the following year)	Budget
2022	$ 600,000
2023	$ 750,000
2024	$ 792,062
Total Not to Exceed Agreement Cost	$ 2,142,062

Equipment and Supplies			Amount	Description
Spawning Supplies		A000	$1,200	Paper towels, knives, cotoon gloves, spoons brushes
Weir		A000	$4,590	Pea gravel, sand bags RV supplies, miscellanious hardware, chain
Miscellanious Consumables/ unknown expenditures		A000	$13,200	Lumber, glue, hardware, blades, caulking, tool and tool batteries, filter, salt
Janitorial	EA	A030	$600	Garbage bags, soap, cleaners
Staff equipment and PPE's		A060	$5,000	rain gear, wader and boots, gloves,hat and life jacket
Safety		A090	$2,850	Formalim Filter Cartriages and other Safety items
Hatchery repairs		A320	$4,000	Miscellanious reapirs & projects
Office Supplies		A430	$625	Ink toner, pens, pencils, other
Paper		A436	$100	Copy paper
Cell Phones		B020	$1,065	cell phones
Mailing Items	EB	B050	$2,800	Mailing fry, otoliths, Mail Box rental and other mail related items
Utilities Due Credit		C020	**($3,492.00)**	
Propane Travel Trailer Sept to November		C050	$200	propane for tavel trailer
Shed rental	**ED**	D060	$150	Rental shed for storage of weir tools and gear
Computer leasing	**EE**	E050	$410	Computer leasing
Printing	**EF**	F000	$100	Olympia charge - no overhead on line description
Trainings (Professional Development)	EG	G000	$2,500	Training
Conferences		G010	$1,500	Fish Culture Conference
Hearing tests			$300	Hearing tests 4 people
Health Force	**ER**	R290	$400	Physical 4 people
Security For tip gate opening and closings		R130	$11,827	Security Work
Fuels and Veh. Maintenance		S050	$5,125	Gas, Vehicle maintenance,
Mileage			$1,250	mileage
Boiler inspection		Z070	$150	Inspection of Pressure vessels
P-Card Credit		Z120	($0)	
Comdata Credit		Z120	**($0)**	
Personal Operated vehicles	GC	C010	$500	POV
Vehicle F-250	**GN**	N040	$4,064	F 250 monthly Charge
F-250 Mileage	**GN**	N042	$4,250	Overage for mileage (first 500 miles free)
Handhelp devices repair / replace	JA	A050	$1,000	DO meter, temperature display
Software License	**JB**	B000	$200	Adobe Reader

Equipment and Supplies	Months	Current Invoice	Annual Amount Budgeted	Annual Amount Remaining
Spawning Supplies		$0	$1,200	$1,200.00
Weir		$0	$4,590	$ 4,590.00
Miscellanious consumables / unknow expenditures		$0	$13,200	$ 13,200.00
Janitorial		$0	$600	$ 600.00
Staff equipment and PPE's		$0	$5,000	$ 5,000.00
Safety		$0	$2,850	$ 2,850.00
Hatchery repairs		$0	$4,000	$ 4,000.00
Office Supplies		$0	$625	$ 625.00
Paper		$0	$100	$ 100.00
Cell Phones		$0	$1,065	$ 1,065.00
Mailing Items		$0	$2,800	$ 2,800.00
Utilities Due Credit		$0	**($3,492.00)**	$ (3,492.00)
Propane Travel Trailer Sept to November		$0	$200	$ 200.00
Shed rental		$0	$150	$150.00
Computer leasing		$0	$410	$ 410.00
Printing		$0	$100	$ 100.00
Trainings (Professional Development)		$0	$2,500	$ 2,500.00
Conferences		$0	$1,500	$ 1,500.00
Hearing tests		$0	$300	$ 300.00
Health Force		$0	$400	$400.00
Security		$ -	$ 11,827	$ 11,827.00
Fuels and Veh. Maintenance		$0	$5,125	$5,125.00
Mileage		$0	$1,250	$1,250.00
Boiler inspection		$0	$150	$ 150.00
P-Card Credit		$0	($0)	$ (0.00)
Comdata Credit		$0	**($0)**	$ (0.00)
POV		$0	$500	$ 500.00
Vehicle F-250		$0	$4,064	$ 4,064.00
F-250 Mileage		$0	$4,250	$4,250.00
Replace handhelp devices		$0.00	$1,000	$ 1,000.00
Software License		$0.00	$200	$ 200.00
Equipment and Supplies Total			**$62,872.00**	**$62,872.00**

22-048-A ATTACHMENT A

SCOPE OF SERVICES & SCHEDULE

INTRODUCTION

This Agreement facilitates SPU's commitment meeting the long-term sockeye mitigation obligations in the Landsburg Mitigation Agreement (hereafter "LMA") (**Attachment F**) and affiliated sockeye monitoring required in the Cedar River Watershed Habitat Conservation Plan[1].

PURPOSE

The purpose of this Agreement is to develop a service agreement between SPU and WDFW that defines the commitments, expectations, roles, and relationships for technical and operational support services for a sockeye salmon hatchery program pursuant to implementation of the LMA (Attachment F):

SPU and WDFW recognize unanticipated events may occur which could cause the Parties to this agreement to agree to modify goals, change operation guidelines, protocols, and procedures. Should the Parties agree that operational changes should be undertaken, the Parties should document such undertaking in writing by an amendment to the Scope of Work or to the LMA, if necessary. The Parties shall coordinate their efforts and collaborate in seeking approval, when necessary, from the LMA parties and the Muckleshoot Indian Tribe (MIT).

SCOPE OF WORK

The Cedar River Hatchery is not to be used for any hatchery operation, fish production, or service that has not been reviewed and agreed upon by Seattle Public Utilities.

This Scope of Work covers these tasks:
Task 1 Broodstock Collection
Task 2 Fish Production
Task 3 Annual Budgeting
Task 4 Facility Maintenance and Housing
Task 5 Equipment and Vehicles
Task 6 Communications
Task 7 Emergency Management
Task 8 Hatchery Monitoring and Evaluation Support
Task 9 Permits

[1]City of Seattle. 2000. Final Cedar River Watershed Habitat Conservation Plan

Task 1 BROODSTOCK COLLECTION

The collection of the appropriately timed and number of returning adult sockeye salmon to be utilized in meeting the hatchery's annual production goals will be a shared responsibility between WDFW and SPU. Annual broodstock collection goals will be consistent with meeting the hatchery sockeye production goals and limiting adverse impacts to Chinook salmon consistent with the requirements of the Endangered Species Act 4(d) approved Hatchery Genetic Management Plan and associated Biological Opinions. The Hatchery Manager will develop a draft Annual Production Plan and will provide it to SPU by August 1 of each year. The Production Plan will include guidelines and protocols for number of adult sockeye to collect based on preseason forecasts and counts at the Ballard Locks[2]. The Hatchery Manager will update the Production Plan at the end of the broodstock collection season.

Broodstock collection may occur at the existing Broodstock Collection Facility (BCF) on the Cedar River at river mile (RM) 1.7, in Renton, the Landsburg fish passage facility, and from the Ballard Locks. The RM 1.7 site will be the primary site, with SPU being the lead for providing for the trapping facilities, support facilities and equipment needed to collect returning adults. WDFW will assist in weir placement and removal. The Landsburg Fish Passage Facility and Ballard Locks may be used as additional broodstock collection locations if both Parties are in agreement regarding proposed activities for the season.

WDFW and SPU will develop, coordinate, and provide annual training to the hatchery staff that operate and maintain the weir site. SPU and WDFW will mutually agree upon training content, schedule, location, and participants.

The BCF will be operated according to the BCF Operating Guidelines approved by the LMA Parties. Updated guidelines will be provided by September 1st of each year; if they are not provided before this time, the most recent BCF Operating Guidelines will be used for hatchery operations. Any proposed changes to the BCF Operating Guidelines must be received by SPU by July 1.

It is anticipated that the existing BCF and related infrastructure will begin operation two days after Labor Day and be removed when SPU and WDFW mutually agree that the weir can no longer be safely operated. The installation schedule is set by the Conditional Use Permit issued by the City of Renton. SPU and WDFW have a shared goal of leaving the broodstock collection facility operable as long as weather and river conditions allow and sockeye are still present in the river.

This agreement provides funding and obligates WDFW to conduct the day-to-day operation and maintenance of the RM 1.7 broodstock collection facility, including hauling of broodstock from the weir trap to the Cedar River Hatchery. Day-to-day operations include opening and closing the trap and weir to maximize the collection of adult sockeye broodstock, sorting sockeye by sex, recording fish counts (all species), checking sockeye salmon for tags or marks, safely passing upstream non-targeted species, monitoring and documenting Chinook salmon activity below and above the weir, limiting the delay of

[2] The number of sockeye counted at the Ballard Locks does not always accurately predict the number of sockeye entering the Cedar River. Should a more accurate estimate of the number of sockeye entering the Cedar River become available during the term of this agreement, SPU and WDFW may agree to use that value to estimate annual hatchery fry production.

migrating Chinook in a manner consistent with the Broodstock Collection Operation Guidelines, and hauling broodstock to the hatchery. WDFW is responsible for communicating Chinook mortalities to SPU within a timely fashion and NOAA (as per the Hatchery Genetic Management Plan).

WDFW will also provide employee presence at the weir at all times while the facility is installed in the Cedar River, i.e. 24 hours per day. Other operational duties for WDFW staff assigned to the trap site include, but are not limited to, fish trap adjustments; rack cleaning; trailer, storage container and grounds cleanup; recording activities performed; and interacting with the public. These duties are only undertaken when river and weather conditions allow for them to be conducted safely. Under this agreement, maintenance for this facility is defined as work routinely done to keep equipment such as the weir, trap, storage container, and trailer in good working order. Examples include removing sticks, carcasses, small logs and leaves from the weir, tightening loose parts, and replacing damaged pickets on the weir. Major repairs to the resistance board weir and other permanently placed infrastructure at the weir site is the responsibility of SPU. SPU will provide security cameras and fencing while WDFW will handle arrangements for any desired security personnel. Changes to security support can be made with agreement by WDFW and SPU.

If both Parties to this Agreement are in agreement regarding broodstock collection activities at the Landsburg Fish Passage Facility then the Landsburg Mitigation Coordinator and WDFW Hatchery Manager will jointly determine the appropriate level of staffing and transportation needed to support sockeye broodstock collection and transport from the Landsburg dam to the hatchery (refer to last paragraph of PURPOSE of this Agreement for additional detail regarding operational changes). SPU will manage all fish ladder sorting and WDFW will provide support staff, as agreed upon by SPU and WDFW. Adult collection guidelines and protocols for this site will be developed by SPU. In the years that the Landsburg Fish Ladder site is utilized to meet the hatchery's broodstock goal, the SPU Landsburg Mitigation Coordinator will be responsible for timely communications and coordination with WDFW hatchery staff. A written summary and data on broodstock collection will be included in the Cedar River Sockeye Hatchery Annual Report, which is covered in Task 2 of this agreement.

WDFW may request WDFW staff and SPU fish trucks be available to support broodstock collection at the Ballard Locks and SPU approval is required prior to May 1 of each calendar year. This provides both SPU and WDFW time to discuss and coordinate facility and staff schedules needed to support the activity.

Deliverable	**Annual Due Date**	**Notes**
Proposed changes to BCF Operations Guidelines	July 1	
Draft Annual Production Plan	August 1	
Final Annual Production Plan	Sept. 15	

Updated Annual Production Plan	May 1	Production plan is updated with actual production from the previous brood year.

Task 2 FISH PRODUCTION

This agreement provides WDFW with funding and obligates WDFW to perform the hatchery operations to meet annually determined fish production goals described in the Annual Production Plan. Fish production consists of hatchery activities associated with adult fish capture, transport, holding, and spawning, carcass distribution, incubation, rearing, disease screening and control, marking, and fry releases consistent with the Adaptive Management Plan and BCF Operating Guidelines. It is recognized by SPU and WDFW that achieving all criteria associated with the annual production goals and schedules are dependent on run size, timing, behavior of sockeye and Chinook salmon, weather, river flows, weir operations and spawning times.

The outcomes of this task are summarized in the Cedar River Sockeye Hatchery Annual Report. The report will include a summary of Broodstock Collection, Fish Production, Monitoring and Production Schedule activities. It will also address safety, training, site security, staffing, budget status, equipment, and housing and facility maintenance activities or issues that WDFW observed or worked on. WDFW will document other relative and general information such as severe weather conditions, fish kills, disease outbreaks and all other observations that impacted annual operation both in a positive and negative manner. WDFW will deliver a *Draft Cedar River Sockeye Hatchery Annual Report* to SPU by June 15th. SPU will provide any final comments by July 31st, and WDFW will provide a *Final Cedar River Sockeye Hatchery Annual Report* no later than August 31st.

Deliverable	**Annual Due Date**	**Notes**
Draft Cedar River Sockeye Hatchery Annual Report	June 15	SPU provides reviewer comments by July 31.
Final Cedar River Sockeye Hatchery Annual Report	August 31	

Task 3 ANNUAL BUDGETING

No later than April 1st of each year, WDFW will provide SPU with a Draft Budget Request table for the upcoming season. The budget will include salaries, benefits, equipment and supplies and facilities and administration categories, and be in the format shown in **Attachment B**, Table B-2. The budget table will include the number and the classifications of staff to be hired for the operation of the Cedar River Sockeye Hatchery and the broodstock collection locations. The plan will identify positions that have been assigned standby for each site.

SPU will provide up to a maximum of $750,000 for total annual facility operation and WDFW maintenance responsibilities identified in the Cedar River Sockeye Hatchery Maintenance Responsibility Assignment Table. Exact annual budget values will be agreed upon in the Notice To Proceed letter issued annually to WDFW from SPU and may be less than the maximum allocated for that year within the MOA.

WDFW and SPU will notify each other when key project managers or hatchery staff change. All WDFW staff working at the Cedar River Hatchery must receive clearance to access Landsburg and the Cedar River Watershed (see **Attachment C**, SAID and Background Check and **Attachment D,** Cedar River Water Quality and Protection Regulations). Both SPU and WDFW agree to comply with the Drug Free Workplace Act of 1988 and their respective policies regarding a drug free workplace.

SPU and WDFW agree that the hatchery production activities that occur at the Cedar River Hatchery Site are in close proximity to the City's water supply infrastructure and therefore each shall conduct operations respectfully of the operations of all facilities operated by the either SPU or WDFW.

SPU and WDFW shall be responsible to supervise their respective employees. Neither party is authorized to discipline or reprimand the job performance of the other employees of the other party. However, performance may be discussed by SPU and WDFW managers and supervisors to improve safety, performance or operations.

Staff funded by this Agreement are for the implementation of the Cedar River Sockeye Hatchery Program. The use of Cedar River Hatchery staff outside this project will not exceed five working days per year per employee. Any temporary assignment of Cedar River Hatchery staff to locations outside the Cedar River will be primarily for staff development and training and improve staff's ability to perform duties associated with the operations of the Cedar River Hatchery. If times occur when activities at the Cedar River Hatchery are less than enough to keep all staff fully active, WDFW, through its Hatchery Manager or Regional Hatchery Operations Manager, will consult with the SPU Landsburg Mitigation Coordinator for additional training or work opportunities associated with the LMA.

This Agreement provides funding and obligates WDFW to ensure that WDFW FTE and the career seasonal receive regular training for swiftwater river work and operation of the SPU fish hauling vehicles. All other training required for WDFW staff will be handled by WDFW to meet employee safety standards.

Deliverable	**Annual Due Date**	**Notes**
Draft Hatchery Budget	April 1	
Final Hatchery Budget	June 1	

Task 4 FACILITY MAINTENANCE AND HOUSING

The Cedar River Sockeye Hatchery Maintenance Responsibility Table (**Attachment J**) identifies responsibilities for SPU and WDFW to ensure timely, efficient, and effective facility maintenance that is consistent with the policies and procedures of each organization and makes the best use of the fiscal resources provided for the project by the LMA. The table identifies SPU work units and also provides expected response times for tasks. Review and updates to the Sockeye Hatchery Maintenance Responsibility Table can be made as agreed upon by both SPU and WDFW.

WDFW and SPU have determined that providing housing in support of the Cedar River Sockeye Hatchery is essential to perform stand-by duties as described in the WDFW Cedar River Hatchery stand-by rules (**Attachment K**). WDFW shall act as the real property management agent for SPU for the residences at the Sockeye Hatchery. WDFW shall comply with the Residence Management Provisions set forth in **Attachment E**. WDFW shall ensure that the tenants assigned to the on-station positions at this hatchery also comply with the Residence Management Provisions, as applicable in **Attachment E** and those of the Cedar River Municipal Watershed Access, Water Quality and Control Regulations (**Attachment D**)**.** To clearly define residence maintenance responsibilities to and between the Parties, Table E-1 was developed and is included in the Resident Management Provisions (**Attachment E).**

Task 5 EQUIPMENT AND VEHICLES

This task refers to hand tools, shop tools and other small equipment that is not otherwise serviced through work orders or vendor contracts and vehicles owned by SPU but operated by WDFW. Equipment purchased under this Agreement and billed to SPU is the property of SPU and upon completion of work, all such materials or equipment shall be returned to SPU prior to the final payment. All SPU-owned equipment shall be recorded and labeled with SPU inventory tags following SPU policy.

Equipment otherwise obtained by WDFW shall be the property of WDFW. These items shall be recorded and labeled with WDFW inventory tags following WDFW policy. WDFW will notify SPU when it is necessary to purchase any equipment that exceeds $1,000 in value. SPU retains the right to purchase any equipment more than $1,000 in value. In an emergency, WDFW may purchase equipment up to $1,000 in value that was not previously budgeted, if immediately afterwards, WDFW notifies SPU in writing of the purchase and describes the emergency. WDFW is not required to request duplicate authority to purchase items already negotiated and approved by SPU.

In the development of the annual budget and production plan, WDFW shall provide SPU a request for new equipment and materials that it believes necessary to complete the project. Included in such list shall be an estimated cost on a per item basis. Such list will be reviewed by SPU and if necessary, negotiated with WDFW. A determination will be made as to which entity will purchase the agreed to items. WDFW shall, with SPU's review, develop equipment maintenance procedures and schedules for all new and existing major equipment, unless that is covered in the SPU Facilities Asset Management Plan.

This agreement allows WDFW permanent and long-term temporary staff members to operate and fuel City-owned vehicles for use in fulfilling obligations outlined in this agreement. Use of City-owned vehicles, tools, or equipment by WDFW is subject to the terms of SPU AGREEMENT NO. 22-048-A, including all sections regarding indemnification and insurance. WDFW shall follow the City of Seattle Code of Ethics (SMC Chapter 4.16) for use of City-owned vehicles and for fueling. City of Seattle fuel can only be dispensed into the following equipment: Vehicle no. 36552, a 2003 Peterbilt Fish-Hauler and Vehicle no. 32776, a 2014 Ford F550. City of Seattle fuel cannot be dispensed into WDFW-owned vehicles or equipment. WDFW, when using City of Seattle vehicles, will keep them clean and in good, working order. Fuel tanks on these vehicles should remain at 25% full or higher. Vehicles will be returned to SPU's Cedar River Sockeye Hatchery or Landsburg facility nightly. Vehicles will be maintained by City of Seattle Fleets and Administrative Services mechanics. All vehicle mechanical work will be arranged through SPU.

All vehicles, equipment and materials purchased by SPU under this Agreement shall be used for Cedar River Sockeye Hatchery operations. SPU must be notified prior to use of SPU equipment outside the scope of this Agreement, and this use will be reviewed for reimbursement purposes. Mileage for vehicle use for non-Cedar River Sockeye Hatchery operations should be itemized in the hatchery annual report.

WDFW and SPU will cooperatively complete an inventory of all SPU-owned equipment by June 30th of every odd numbered year.

Deliverable	**Due Date (odd numbered years only)**	**Notes**
Inventory of SPU-owned equipment	June 30	Jointly completed by WDFW and SPU

Task 6 COMMUNICATIONS

WDFW and SPU shall name two designated persons as the points of contact for the term of this Agreement. Both WDFW and SPU shall provide a backup on-site contact and phone numbers, email addresses, and mailing addresses for contacts. If the contact for either entity changes, notification shall be provided to the other within a timely manner.

Both entities agree that a major goal of this Agreement is to ensure good communications are maintained and enhanced. There are two important elements of communications that this Agreement addresses. First is communication expectations between SPU and WDFW, and the second element defines the expectation when communications occur with others about this project. Both SPU and WDFW recognize that each has individual responsibility to ensure that timely and meaningful communications occur. During busy times of the year, daily communications may be required to ensure efficient and effective use of staff, equipment, and facilities is achieved. In preparing for an upcoming

spawning year, starting the first week of August, the SPU's Landsburg Mitigation Coordinator and WDFW's Lead Hatchery Specialist will establish a regular meeting schedule (e.g. every two weeks). Meetings will occur throughout the year to facilitate planning for and achieving the annual hatchery goals and facility maintenance. WDFW will communicate information regarding fish stock on hand (adults, eggs, or fry), mortalities spawning, and release activities on a regular basis throughout the fish season. This typically means weekly updates.

Both entities agree that no public blame is to be placed on either party by the other. Any news releases, informational pamphlets or brochures, website information, or other significant informational media prepared by WDFW concerning the Cedar River Sockeye Hatchery shall acknowledge SPU's ownership, responsibilities and funding of the project, or if prepared by SPU, acknowledge WDFW's responsibilities. WDFW and SPU shall not publish, release, disclose, or announce to any member of the public or press, official body, or any other third party any information concerning the other Party without their prior review of the information and consent.

Proper disclosure of information is an important component of communication in support of the goals of this agreement. Therefore, any reports, information, or data that are intended to be reviewed and provided, by WDFW, to a third party and that have been developed while operating the Cedar River Sockeye Hatchery or related monitoring and evaluation programs, are to be reviewed and approved by SPU. WDFW shall supply such documents in draft form to SPU for review, comment and approval before finalization or distribution unless: (a) Reports and data have been previously submitted and approved by SPU; (b) Reports are otherwise specified in an annual operation plan and are required by a federal or state law or permit, or (c) Reports are protected from disclosure to SPU by state or federal law. WDFW will provide SPU with a reasonable time to review and approve submitted reports and data. SPU will review submitted reports and data in a reasonable time.

During work, and as time allows WDFW permanent staff will politely respond to questions from the public about the weir operations, sockeye transport and/or Cedar River salmon. If questions are from the media, other than their name and employer, WDFW staff will provide the reporter with contact information for the WDFW Hatchery Manager and SPU Landsburg Mitigation Coordinator. WDFW temporary staff will not discuss the hatchery program or operations with stakeholders or the media, when encountered at the broodstock collection facility. The temporary workers must refer those questions to the WDFW Hatchery Manager or his/her designee.

Deliverable	**Annual Due Date**	**Notes**
Regular Hatchery Facilities Meetings	NA	SPU and Hatchery staff meet weekly or bi-weekly, depending on need.

Task 7 EMERGENCIES

Funding is provided and obligates WDFW to provide emergency response in the event fish at the hatchery site or the broodstock collection facility are at risk due to mechanical failure or other cause. While fish are being actively trapped or cultured, WFDW shall have at least one standby employee on the hatchery site during all hours after regular work hours. The standby employee must always be fit for duty. SPU provides permanent housing at the hatchery site and temporary living quarters (28-foot trailer) at the broodstock collection facility site to aid WDFW in providing emergency response, public safety and protection of property. WDFW and SPU shall provide training to the onsite employees such that they can provide emergency response. In the event SPU personnel are required to assist in an emergency, the standby employee for WDFW shall contact the appropriate SPU contact, as outlined in the Hatchery Emergency Call Plan (**Attachment L**). In the event of an emergency involving the LOC backup generator, which serves as a backup generator to both the hatchery spring pumps and the LOC, WDFW must follow the LOC backup generator protocol and SPU staff for all communications and actions (Attachment N).

Facility emergencies are defined as: any equipment breakdown or malfunction at the hatchery facility, including spring ponds and water pipes, and broodstock collection facility that:

-Poses a direct threat to fish life within a time shorter than the response period. For example, if a facility emergency occurs at 3 am and fish could die in two hours, enact the Emergency Call Plan; or

-Impacts major facility systems (e.g., water supply, boiler, HVAC system), which will cause major damage to the facility or loss of fish life.

-Poses a direct threat to the facility through flooding, fire or other destruction.

The protocol WDFW is to follow under facility emergencies is outlined in **Attachment L**, the "Facility Emergency Call Plan for the Cedar River Hatchery."

For any chemical spills or spill response at the facility, WDFW personnel will follow the "Landsburg Fish Hatchery Spill Response Plan" (**Attachment M**).

Deliverables

There are no deliverables specific to this task.

Task 8 HATCHERY MONITORING AND EVALUATION SUPPORT

Under this task, WDFW hatchery staff will support Cedar River Hatchery Monitoring and Evaluation as described in the following paragraphs and as agreed to by both parties of this Agreement.

For fry condition measurements, WDFW hatchery staff will sample fry regularly prior to each release from the hatchery. Hatchery staff will also sample fry at regular intervals from the fry trap during the period when the trap is operated and fry are captured. Metrics collected are to include: source (hatchery or Cedar River), length (mm), weight (g) and yolk rating (1 through 5). Hatchery staff will provide fry condition data to SPU in the Microsoft Excel format that SPU provides.

Hatchery staff will provide field support for the smolt seining led by WDFW in Lake Washington, typically by sending one hatchery staff member to sample with the WDFW Science Group, or another SPU-selected agency or contractor. Additionally, hatchery staff will collect fork length and weight measurements on sampled smolts and be responsible for preserving and shipping biological samples to labs for analyses, such as otolith or scale readings. Hatchery staff will provide smolt sampling data to SPU in the Excel format that SPU provides.

WDFW hatchery staff will also support annual biosampling sampling of sockeye broodstock, in coordination with WDFW Region 4, or another SPU-selected agency or contractor.

WDFW hatchery staff will provide field support for adult sockeye sampling at the Locks, as needed. Support of Locks sampling by hatchery staff will be requested by WDFW to SPU on an annual basis and effort will be included in the annual hatchery operations report. WDFW hatchery staff will support WDFW Region 4, or other SPU-selected agency or contractor, in field sampling otoliths and other metrics near the Ballard Locks.

Deliverable	**Annual Due Date**	**Notes**
Smolt field data	July 1	To be collected as annually agreed by SPU and WDFW.
Fry condition data	May 1	Raw data only; average of fry condition is provided in the annual report.

Task 9. Permits

Listed Parties shall be responsible for obtaining all permits necessary for the operation of the hatchery and will provide a copy of permits and regulatory compliance documents to SPU. In the case that a violation occurs for any permit associated with the operation of the hatchery, WDFW shall notify the SPU Landsburg Mitigation Coordinator within 24 hours. Permits and responsible parties are:

Nationwide Permit 4/Clean Water Act (ACOE and WDOE): SPU
National Pollutant Discharge Elimination System: WDFW
Hydraulic Project Approval (WDFW): WDFW will include Cedar River Sockeye Hatchery facilities in Statewide Hatchery HPA permit.
City of Renton Conditional Use Permit: SPU will secure a Conditional Use Permit from the City of Renton for use of the shoreline easement for the BCF.
Hatchery Genetic Management Plan (HGMP-NOAA): WDFW

ATTACHMENT B
SPU Agreement Number 22-048-A

TERMS OF INVOICING & PAYMENT

EFFECTIVE DATE	COMPLETION DATE	DOLLAR AMOUNT
October 1, 2022	**June 30, 2025**	**$2,142,062**

BASIS OF PAYMENT (Hourly rate, lump sum, etc.) and INTERVALS OF PAYMENT
(If you have a Cost Breakdown, Attach as ATTACHMENT B-1)

Invoice once per month. Payments to WDFW are based on monthly billings from WDFW to SPU, which are reimbursement for WDFW's actual cost of operation of the Cedar River Sockeye Hatchery

PROVIDER SHALL SUBMIT INVOICES TO:	INVOICES SHALL INCLUDE THE FOLLOWING:
Accounts Payable **Seattle Public Utilities** **PO Box 34018** **Seattle WA 98124-4018**	**1. Invoice date and number** **2. SPU Agreement Number** **3. Period covered by the invoice** **4. Breakdown of charges** **5. Description of services performed and budget tracking consistent with Table B-3**

SUBCONTRACTORS OR SUB-CONSULTANTS AUTHORIZED (Enter "NONE" if not applicable)

None

NAME OF BUSINESS OR AGENCY KEY PERSONNEL ESSENTIAL TO THE PROJECT

Carol Volk, SPU Landsburg Mitigation Coordinator
Brodie Antipa, WDFW Regional Hatchery Manager

NAME AND ADDRESS OF SPU'S PROJECT MANAGER

Carol Volk
Seattle Public Utilities
700 5th Avenue, Suite 4900
P.O. Box 34018
Seattle, WA 98124-4018

BUSINESS / AGENCY NAME AND ADDRESS FOR DELIVERY OF NOTICES	SPU'S NAME AND ADDRESS FOR DELIVERY OF NOTICES
Brodie Antipa **Soos Creek Hatchery** **13030 SE Auburn-Black Diamond Rd** **Auburn, WA 98092**	**Carol Volk** **Seattle Public Utilities** **700 5th Avenue, Suite 4900** **P.O. Box 34018** **Seattle, WA 98124-4018**

Seattle Public Utilities
City Employee
Secure Access ID (**SAID**) Card Application

Date: Click here to enter a date.

Mechanical Key ☐
Reason for Key Usage - list in 'Additional Info' section at bottom of application.

New ☐ Lost ☐ Update ☐ Broken ☐	Work Start Date / Work End Date	Card #	TES ☐ Intern ☐ Other ☐ Explain 'Other' in 'Additional Info' section at bottom of application.
Supervisor of Employee (Print)			
Employee Name			Employee ID
City Dept \ Branch \ Division \ Unit			Job Title
SPU Low Org	Home Office Location	Office Phone	Mobile Phone

SPU Asset Owner-Operator approval REQUIRED, view the list at SPUWEB/Security

SPU Security Office - Access Control
206-684-8516
SPUCardAdmin@Seattle.gov

Days / Times: 5a-7p M-F	Days / Times: 24 / 7	Days / Times: Other	Location / Building	Area / Floor
☐	☐		SMT ☐	27 ☐ 31 ☐ 40 ☐ 44 ☐ 45 ☐ 46 ☐ 47 ☐ 48 ☐ 49 (Exec) ☐ 49 (HR) ☐ 50 ☐ 53 ☐ 59 ☐ 61 ☐ Freight Elevator ☐
☐	☐		OCC ☐	Floor 1 ☐ Floor 2 ☐ S. Vehicle Gate ☐ Other
☐	☐		NOC ☐	Floor 1 ☐ Floor 2 ☐ Gates ☐
☐	☐		Materials Test Lab ☐	Main Entry ☐ All Doors ☐
☐	☐		Park 90/5 ☐	Main Entry ☐ Storage Rm N & S Doors ☐
☐	☐		Haller Lake ☐	FAS Gates ☐ DWW Hygiene Facility ☐ DWW Trailer 2 ☐ PDEB Trailer 3 ☐
☐	☐		Charles Street ☐	FAS Gates ☐ DWW Doors ☐ Other
☐	☐		CSO ☐	Arm/Disarm ☐ Other Reader ☐
☐	☐		Ballard Office Bldg ☐	Main Entry ☐ Gate ☐
☐	☐		South Ops. Center ☐	Building ☐ Gate ☐
☐	☐		Beacon Hill Office ☐	Building ☐ Gate ☐
☐	☐		Water System ☐	**Reservoirs - Pump Stations - Standpipes - Tanks** Gates ☐ Hypo Bldg ☐ SCADA ☐ Other
☐	☐		Landsburg Dam ☐	Main Gate ☐ Dam Gates ☐ Fish Hatchery Gate ☐ Screen House ☐ LOC Bldg ☐
☐	☐		Lake Youngs ☐	Gates ☐ Building ☐ Blue Stone Building ☐
☐	☐		Duvall Shop ☐	Gates ☐ Building ☐
☐	☐		Transfer Station – N ☐	Floor 1 ☐ Floor 2 ☐ Floor 3 ☐ Scale Houses ☐
☐	☐		Transfer Station – S ☐	Floor 1 ☐ Floor 2 ☐ Scale Houses ☐
☐	☐		HHW ☐	N-HHW Gates ☐ N-HHW Bldg ☐ S-HHW Gates ☐
☐	☐		Tolt Transmission ☐	Kelly Rd Gate ☐ Pipeline Gates ☐ Tolt Dam ☐ Regulating Basin ☐
☐	☐		Tolt Treatment ☐	All Rdrs ☐ All Rdrs X Srvr Rm ☐ All Rdrs X Svr Rm & Chlor Stor ☐ Admin Bldg ☐ Server Rm ☐
☐	■		Cedar River Watershed ☐	Headquarters ☐ Chester Morse ☐ Masonry Dam ☐ Other
☐	■		S. Fork Tolt Watershed ☐	North Ridge ☐ South Ridge ☐ Shoreline ☐ Other
☐	☐		Water Quality Lab ☐	

Additional Information:

Form version 08.12.2018

Email Subject Line

Help us process your application quickly! ☺
Use these subject naming protocols when emailing your application to **SPUCardAdmin@Seattle.gov**

SAID Card Requests:

- **New** requests - use subject line: **(LAST NAME)_New**
- **Update** access - use subject line: **(LAST NAME)_Update**
- **Lost** SAID cards – use subject line: **(LAST NAME)_Lost**
- **Broken** SAID cards - use subject line: **(LAST NAME)_Card Not Working**

Mechanical Key Requests:

- Use subject line: **(LAST NAME)_Mech Key**

Send completed applications to your branch Executive Assistant:

- Your branch Executive Assistant (EA) will help you obtain SPU Asset-Owner Operator approval, their names are listed at **SPUWEB/Organization**. After approvals are obtained the EA will email your application to **SPUCardAdmin@Seattle.gov** for processing.
  Applications without SPU Asset Owner-Operator approval will not be processed.

Access Control for City Employees

Report Lost or Missing SAID Cards Immediately

Notify the SPU Operations Response Center (ORC) immediately **206-733-9300** (24/7).
SAID cards can be deactivated upon notification, this will significantly reduce the risk of unauthorized access.
To receive a replacement card complete this application and email to **SPUCardAdmin@Seattle.gov**

Your Security Responsibilities

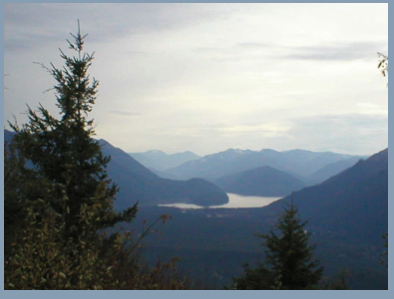
- Keep your Secure Access Identification (SAID) Card on your person all times while on SPU property.
- Do not give or lend your SAID card or SPU keys to anyone.
- Use your SAID card at all card readers for entry and exit.
- Do not follow other people through a door without presenting your SAID card at the card reader (also referred to as "tail-gating"). **Tail-gating is prohibited**.
- Make sure doors and gates are completely closed and locked behind you before you leave SPU property.
- Return your SAID card and SPU keys to SPU Security when changing jobs and/or ending SPU employment.
- Questions? Contact the SPU Access Control Administrator, **SPUCardAdmin@Seattle.gov**

SPU Security Personnel Cannot Authorize Access

SPU Security personnel cannot authorize or approve access to SPU facilities. The function of SPU access control is to process request forms and verify forms have the proper authorization. All requests for access **must** be authorized by the SPU Asset Owner-Operator, their names are listed at **SPUWEB/Security**

Cedar River and South Fork Tolt Watersheds

Water Quality and Protection Regulations



We are the source for 1.4 million customers in the seattle metropolitan area

Watershed Protection Section

January, 2011 V. 1

Seattle Public Utilities

Upper Cedar River Watershed in winter

Seattle Public Utilities

In addition to providing more than 1.4 million customers in the Seattle metropolitan area with a reliable water supply, SPU provides essential sewer, drainage, solid waste and engineering services that safeguard public health, maintain the City's infrastructure and protect, conserve and enhance the region's environmental resources.

Table of Contents

OVERVIEW

The Cedar River Municipal Watershed (CRMW) and the South Fork Tolt Watershed (SFTW) are the primary sources of drinking water for 1.4 million customers in the Seattle Metropolitan Area. Compliance with state and federal drinking water quality regulations governing 'limited alternative to filtration (LAF)' sources of drinking water (WAC 246-290-691) require that land within the boundary of the Cedar River Watershed be subject to strict water quality protection controls.

Although the South Fork Tolt Watershed does not fall under the same LAF requirements, the South Fork Tolt Watershed Management Plan and current Best Management Practices provide similar framework to ensure the highest quality source water protection possible. Therefore, all persons accessing the CRMW or the SFTW shall adhere to the following water quality and protection regulations at all times.

*These regulations do **not** address Seattle Public Utilities Security Access Requirements that require all persons requesting access to any SPU facility or secured area be properly vetted and authorized for all unescorted access. For further details or to receive a Security and Access Identification Application (SAID Card) or a Site Security Plan Template, please contact the Watershed Protection Office at (206)615-0203.*

1. Water Quality Regulations

1.1 Sanitation

1. Human waste shall not be deposited on or below the surface of the ground or in any surface water bodies.

2. Vendors or Contractors performing work at stationary work sites are required to provide approved commercial portable or temporary sanitary facilities at their own expense and shall be responsible for proper operation and maintenance of such facilities.

    (a) Location and type of portable or temporary sanitary facilities shall be subject to approval by the Watershed Protection Manager or his or her designee.

    (b) Sanitary facilities shall be placed on flat surfaces and adequately protected against upset.

    (c) Sanitary facilities shall be serviced by a professional servicing provider on a schedule appropriate to the number of persons it is serving.

    (d) Portable or temporary sanitary facilities shall be removed at the completion of the job.

1.2 Job Site Controls

1. Garbage, including all forms of trash and organic material, shall not be deposited on or below the surface of the ground or in any surface water bodies.

   (a) Vendors or Contractors shall provide an approved receptacle for garbage at their expense.

   (b) Garbage receptacles must have a suitable cover that restricts animal access, exposure to the elements, and prevents wind from blowing contents out of receptacle.

   (c) Equipment, materials and garbage shall be removed at the completion of the job.

1.3 Hazardous Materials

1. Certain activities involving hazardous materials may require Vendors or Contractors to provide hazardous spill response equipment and supplies on the job site. The type, size and quantity of such equipment and supplies will be determined by the Watershed Protection Manager or his or her designee.

2. All vehicles and equipment must be in good working order and maintained in a condition that prevents fluid leaks. Vehicles and equipment will be subject to inspection by Watershed Protection personnel.

3. Hazardous materials, including any oil or any other petroleum based products, shall not be discharged into the air or deposited on or below the surface of the ground or in any surface water bodies. Any containers of oil or petroleum based products shall be maintained in a condition that prevents any leakage.

4. Equipment use and maintenance activities shall be undertaken so that no oil or other hazardous materials reach the ground. Normal maintenance and refueling shall be carried out using oil absorbent pads and appropriate containment.

1.3 Hazardous Materials-cont.

5. In the event of a spill of any amount, prompt mitigation action shall be taken in accordance with the SPU 'Hazardous Materials Spill Response Plan', copies of which are located at the Cedar Falls Main Office. Watershed Protection staff and SPU Operations Response Center (ORC) should be notified immediately.

6. Pesticides or fertilizers shall not be used, unless specifically authorized under ordinance and with Watershed Division Director approval.

1.4 Equipment

1. Equipment must be in sound mechanical condition with no fluid leaks of any kind. All equipment is subject to inspection prior to entering the Watershed.

2. Any machinery and equipment that will be used in any location in the Seattle Watersheds with water body contact shall comply with the 'Equipment Decontamination Procedures' outlined in the SPU 'Prevention of Aquatic Nuisance Species in Seattle Water Supply Watersheds', copies of which are located at the Cedar Falls Main Office. The term 'machinery and equipment' includes but is not limited to: boats, barges, trailers, cranes, excavators, cables on heavy equipment, drilling rigs, silt curtains, hoses, pumps, pipes, ropes, shovels, waders and boots, nets, scuba equipment, scientific equipment, and any other personal equipment.

3. Projects involving more than five (5) vehicles, or vehicles requiring repeated disinfection, may be required to install and use a temporary decontamination station at Vendor or Contractor expense, located at an approved site.

1.4 Equipment-cont.

4. Refueling will normally be accomplished by means of a single pick-up mounted fueling tank having a capacity of less than one hundred gallons, except under exceptional circumstances as authorized by the Watershed Protection Manager or his or her designee.

5. Bulk storage for petroleum products or other hazardous materials is only allowed under circumstances when there is no practicable alternative and must be specified by a SPU Project Manager and approved by the Watershed Protection Manager or his or her designee. In such cases the following regulations apply:
   Storage tanks or containers must be protected from accidental damage by vehicles, equipment, slides, etc.

   (a) Tanks or containers must be located at least 100 feet from surface water bodies, including creeks, rivers, lakes, reservoirs and tributaries, except under exceptional circumstances as authorized by the Watershed Protection Manager or his or her designee.

1.4 Equipment-cont.

(b) All tanks or containers must be pre-approved by a Watershed Engineer or his or her designee and must be surrounded by a pre-approved storage and containment facility.

(c) Adequate spill response equipment and supplies must be stored on site, easily accessible and clearly marked.

(d) Bulk storage locations must be pre-approved by the Watershed Protection Manager or his or her designee.

1.5 Erosion

1. All work shall be performed in a manner that prevents erosion or siltation.

   (a) Where culverts, ditches or drainage structures are deemed necessary for protection of the water supply, such facilities shall be constructed by the Vendor or Contractors at their own expense. All work will require prior approval by a Watershed Engineer.

   (b) Upon completion of work, all roads shall be left in such a condition as to not induce soil erosion, or become channels for the collection of surface runoff. Jobsite inspection may be required prior to job completion by both a Watershed Engineer and a Watershed Inspector.

1.6 Camping

1. No camps, tents, tarps or housing facilities may be constructed or maintained within the Watershed without prior written approval of the Watershed Protection Manager or his or her designee.

2. Possessing camping equipment (i.e., tents, sleeping bags, portable stoves, etc.) may constitute illegal camping, which is grounds for permit revocation and possible criminal trespass charges. Single use emergency shelters, such as space blankets, are exempt from this provision.

2. Fire Protection Regulations

1. All persons entering the Watershed are subject to the Washington State Industrial Fire Precaution Levels (IFPL) http://fortress.wa.gov/dnr/ifpl/IFPL.aspx and Watershed Fire Prevention Regulations located in SPU's Fire Resource Manual, available at the Cedar Falls Main Office.

2. No campfires, warming fires, or portable stoves are permitted in the Watershed.

3. No fireworks are permitted.

4. Smoking is prohibited, except inside private vehicles, and no person shall throw or place upon the ground any lighted match, cigar, cigarette or other burning substance while in the Watershed.

5. The Watershed Services Division Director may suspend all access at any time and without prior notice, during forest closures due to high fire danger.

6. Any person(s) who sees smoke or fire in or near the Watershed is obligated to report it immediately to the Watershed Protection staff for investigation.

3. Safety Regulations

3.1 Driving

1. The City does not warrant the condition of any Watershed road and all use of these roads are at the individuals own risk.
2. All persons operating a motor vehicle shall comply with all Washington State Motor vehicle laws which includes seatbelt use at all times.
3. All persons operating a motor vehicle shall drive with their headlights on at all times for safety purposes.
4. Vehicle speed shall not exceed 25 mph, unless otherwise posted. In some cases, poor road conditions, inclement weather, ice and or snow, low lighting, presence of wildlife, etc. will require driving well below the posted 25 miles per hour.
5. The use of alcohol and illegal drugs is prohibited.

3.2 Firearms

1. Firearms are not permitted, except by authorized law enforcement personnel, authorized SPU employees, and other entities with legal agreements that allow such use.

3.3 Emergencies

1. All incidents requiring professional level medical care, fire response, or law enforcement personnel constitutes an emergency and shall be reported to the Cedar Falls Main Office and the Watershed Protection Section as soon as possible. Watershed Protection personnel are trained and certified First Responders in a variety of disciplines and are required to complete reports for all incidents and emergencies that occur in the Watershed and within the boundaries of the Limited Use Areas.

3.3 Emergencies-cont.

2. If an emergency occurs contact 911 if possible. Secondarily contact Watershed personnel using the information below:

    (a) Cedar Falls Main Office (Monday through Friday), 7:30am to 4:30pm, (206) 233-1524

    -or-

    (b) Seattle Public Utilities, Operations Response Center (24/7), (206) 386-1800

3. At a minimum, give the following information:

    (a) Type of emergency

    (b) Location

    (c) Persons involved

    (d) Actions taken

4. Cultural Resource Protection

1. Cultural resources are protected by federal and state law and shall not be disturbed.
2. It is illegal to collect any cultural artifacts from the Watershed, including bottles, cans, logging tools, arrowheads, etc.
3. In the event a cultural site is discovered or unearthed during construction activities all work in the location must stop and the site must be reported to the Watershed Protection Manager or designee immediately.
4. Individuals found disturbing cultural sites or collecting artifacts may have their access rights revoked, be denied further entry to the Watershed, and may be subject to criminal prosecution.
5. Copies of the SPU "Cultural Resource Management Plan" are available at the Cedar Falls Main Office upon request.

5. Large Construction Projects

1. Large construction projects may require completion of a "Water Quality Protection Plan" prior to the commencement of any work. Large projects are typically defined as:

    - Any project requiring more than twenty (20) individual access applications.
    - Projects that have the potential to create serious safety concerns (e.g. fall protection required; water activities planned; specialized heavy equipment use; use of explosives; use of aircraft, etc.).
    - Projects that involve ground disturbing activity that may impact water quality.

2. Water Quality Protection Plans must be approved by the Watershed Services Division Director or his or her designee and will identify additional water quality and protection measures deemed necessary to protect water quality.

5. Large Construction Projects-cont

(a) Vendors and Contractors may be required to submit written plans pertaining to emergency response, safety, water quality protection, hazardous spill response, security, and traffic control, as determined by the Watershed Services Division Director or his or her designee.

(b) Additional plans required by the Watershed Services Division Director will be submitted by the Vendors or Contractors at their own expense.

6. Failure to Comply

1. Any person found to be in violation of these Water Quality Regulations, a Water Quality Protection Plan, or other Watershed regulations, may have their access rights revoked, be denied further access to the Watershed, and be subject to legal prosecution.

2. If there is probable cause to believe that there has been a violation of any of the regulations herein, an investigation will be initiated by Seattle Public Utilities Watershed Protection staff for the purpose of documenting the violation and ensuring future compliance. Lack of compliance or unwillingness to correct the problem may be sufficient reason to escort violators from the Watershed and cancel all current and future Watershed access.

3. All activities in the Watersheds shall be conducted in compliance with all other applicable Federal, State, and local laws, rules and regulations for the protection of domestic water supplies, natural resources, habitat, and cultural resources.

Resources:

SPU Security and Emergency Management Policies and Procedures

SPU Hazardous Materials Spill Response Plan

SPU Prevention of Aquatic Nuisance Species in Seattle Water Supply Watersheds

SPU Fire Resource Manual

SPU Cultural Resource Management Plan

WDNR Industrial Fire Precaution Level information at http://fortress.wa.gov/dnr/ifpl/IFPL.asp

x

The Seattle Public Utilities Department Director or his or her designee, reserves the right to change any/all of these regulations without prior notice as conditions or events require.

Date 9/24/10

Ray Hoffman
Director
Seattle Public Utilities

Watershed
Protection
Office

19901 Cedar Falls Rd SE
North Bend, WA 98045
Phone (206) 615-0203
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ATTACHMENT E

SPU Agreement Number 22-048-A

Cedar River Sockeye Salmon Hatchery Residence Management Provisions

This Attachment establishes the Washington Department of Fish and Wildlife ("WDFW") responsibilities and obligations as the property management agent for the residences at the Cedar River Sockeye Salmon Hatchery, acting on behalf of Seattle Public Utilities ("SPU"), the residence owner. These provisions are a component of and subject to the broader Memorandum of Agreement for Sockeye Hatchery Operations at Landsburg on the Cedar River.

The WDFW employee residents living at the Cedar River Sockeye Salmon Hatchery ("Hatchery") play a key role in the implementation of the of the Landsburg Mitigation Agreement, regional salmon conservation efforts, the community attributes associated with the Cedar River Hatchery Program and the surrounding Landsburg Park area. The employees provide required emergency response and twenty-four (24) hour presence that is essential for the safe and effective production of sockeye salmon at the hatchery facility. Two residences will be provided for WDFW hatchery employees and their families during the employee's annual term of employment, with the physical specifications for the residences and the surrounding areas established by the 2010 Cedar River Sockeye Hatchery Construction Contract Specifications, and such specifications include living quarters, garage, floor and window coverings, residence appliances (kitchen range, refrigerator, dishwasher, clothes washer and drier, hot water heater, and residence heating system) and supporting mechanical and electrical systems (collectively the "Residences"). WDFW acknowledges that the Residences are being provided by SPU on an "AS-IS, WHERE-IS" basis and that SPU shall not be liable in any way for or with respect to the condition of the Residences or the suitability of the Residences for WDFW's intended purposes. WDFW acknowledges that SPU is specifically relying on WDFW as the property manager to determine and discover any defects or problems with the Residences as they occur or arise.

These Residence Management Provisions are intended to establish a common set of standards and guidance for managing and maintaining the hatchery residences in good working order. They are expected to help ensure a safe, effective and pleasing working and living environment for WDFW employees and their families while supporting continued protection of the regional drinking water supply and the Cedar River Municipal Watershed.

WDFW shall manage the use, and allocation of the Residences by and to its employees pursuant to the provisions contained herein and the broader Memorandum of Agreement for the Operation of the Cedar River Sockeye Salmon Hatchery. WDFW shall (i) comply with the following provisions; and/or (ii) ensure that the following conditions are met by the tenants, including

ensuring that tenants are provided notice of and have acknowledged the tenant obligations as hereafter stated, whichever the case may be:

1. WDFW will perform a needs evaluation according to the provisions of WDFW Policy #POL-M1801 to demonstrate that on-site employee residency is essential to proper operation of the hatchery facility. A copy of this evaluation will be provided to SPU.

2. Residences and surrounding yards shall be maintained in good condition at all times. Each employee/tenant shall endeavor to maintain the residence in good condition and that the tenant shall at all times be responsible for maintaining the residence and surrounding yard area in a neat, clean and sanitary condition. In the event that repairs or replacements are necessary, they should be brought to the attention of the WDFW Senior Fish Hatchery Specialist immediately. Specific responsibilities for maintenance of the residences and associated yards are assigned in the attached Table E-1: Residence Maintenance Responsibility Assignment. Tenant assigned residence and yard maintenance will not be done on state time unless it does not interfere with other station duties and responsibilities. If it is determined by the appropriate supervisor that the tenant cannot physically perform yard maintenance activities, i.e., an employee on extended annual leave, sick leave, or other similar or related circumstances, the appropriate supervisor may determine to conduct yard maintenance activities on state time.

3. WDFW tenant employees, their families and visitors agree to abide by the watershed access policies established in the Cedar River Water Quality and Protection Regulations (Attachment D), when in the Cedar River Watershed, e.g., on the 50 Road south of the Cedar River.

4. Prior to obtaining unescorted access to SPU facilities and issuance of SPU Security Access Identification (SAID) Card and/or keys, WDFW employees will undergo a one-time SPU background check. Vetted WDFW employees will be issued security access cards and may be issued mechanical keys, which will afford them 24-hour access to the on-site residences and fish hatchery as well as other parts of the Landsburg facility. Family members living on site will be issued security access cards allowing 24-hour access to the on-site residences without being required to undergo a background check. At no time are family members, or friends of WDFW employees, allowed to enter into the Landsburg Diversion and Treatment area as shown on the attached Landsburg Security Area Site Map, or the Cedar River Watershed. Lost keys and/or security access cards shall be reported to the WDFW Senior Hatchery Specialist, who in turn will immediately notify the SPU Landsburg Mitigation Manager. Loaning SPU security access cards to anyone is prohibited.

5. Failure by WDFW employees, and/or their families, to comply with established SPU security policies and procedures may result in revocation of their access.

6. Each WDFW employee tenant shall be responsible for checking the operation of alarm systems in their residence. Any mechanical failure of the alarm shall be reported to the WDFW Senior Hatchery Specialist who will ensure that the failure is reported to the appropriate SPU contact for repairs as soon as possible.

7. WDFW and tenants are responsible for the conduct of their visitors.

8. Only specifically approved and designated WDFW employees may enter the Landsburg Diversion and Treatment Area adjacent to the hatchery site. Such persons will strictly adhere to all security protocols when entering the area. All other residents are restricted from access into any other areas of the closed Cedar River Municipal Watershed, including the Landsburg Diversion and Treatment Area, without the written permission of authorized SPU authorities.

9. Upon assignment of an employee to a vacant residence, but prior to occupancy, the WDFW Regional Hatchery Operations Manager or his/her designee, in association with the SPU Project Manager or his/her designee and the employee shall carry out a thorough inspection of the residence, utilizing the *Fish and Wildlife Housing Inspection Form*. Upon completion of this inspection, all three persons participating in the inspection shall sign the form and, in so doing, establish the current condition of the residence. After an inspection, an electronic copy of the completed inspection form will be provided to SPU.

10. Each employee and family member living in the residences must respect the privacy and personal property of other hatchery site residents. Each family will be responsible for their children and pets to see that they do not play in work areas or other unauthorized locations.

11. No structural changes and/or improvements to the Residences or surrounding yards may be implemented without the express written consent of the SPU Landsburg Mitigation Coordinator. This includes, but is not limited to interior and exterior fireplaces, decks and patios, fences, garage areas or other physical, changes including major changes to yard and landscaped areas such as adding plantings and/or removal of shrubs and trees.

12. Pets will be limited to a maximum of two pets (dogs/cats) per residence. Dangerous breeds of dogs are not allowed, consistent with WDFW policy. Additionally, no livestock or farm animals will be allowed at the Cedar River Sockeye Hatchery facilities

and associated residences. Tenants with pets will be responsible for keeping pets from causing conflict with neighbors, the general public and work activities at the Hatchery or within the Watershed. Within the Cedar River Municipal Watershed boundary, leashed pets are allowed only within the designated Hatchery Facility Grounds, the Landsburg Park, and 9 road corridor between the Residences and Landsburg Park. Tenants will carry their SPU issued SAID access card at all times when walking or driving along the 9 road to the Landsburg Park. Pet owners will promptly pick up and properly dispose of pet waste. Pets are not allowed to roam freely about the site and must be accompanied by the pet owner. The tenants will be held liable for damage to property incurred by any pet. The tenants will be held liable for any injury to other employees and/or their family members, as well as any visitors whether or not those visitors are within the designated hatchery site.

13. Occupancy of residences shall be limited to a single family per residence. Guest staying longer than 30 days must be approved by the WDFW Regional Hatchery Operations Manager and that approval will be communicated to the SPU Landsburg Mitigation Coordinator.

14. No adhesive backed material (e.g., contact paper, appliqués, wallpaper, etc.) should be affixed on any surface in the residence.

15. Employee tenants shall pay prorated monthly utilities bills based on the square footage for each residence.

16. All refuse will be managed according to hatchery facility policies and in a manner that does not create an attractant for scavenging wildlife.

17. Malicious or willful destruction of property or residence will not be tolerated and the offending tenant shall be subject to having their access revoked and prosecution.

18. The WDFW Hatchery Manager, or designee, and the SPU Landsburg Mitigation Coordinator, or designee, accompanied by tenant, shall perform a formal inspection of each residence at least once each calendar year. The tenant shall be given a minimum of two working days' notice prior to the inspection and the inspection shall be scheduled during the employee/tenant's normal workday. Residence conditions shall be noted and documented in detail on the WDFW Form titled "Annual Housing Inspection Report." The form shall be signed by the tenant and persons conducting the inspection. Upon annual inspection, an electronic copy of this form will be provided to SPU.

    Upon vacating a residence, the WDFW Regional Hatchery Operations Manager or designee, and the SPU Aquatic Resources Manager, accompanied by the vacating tenant,

will inspect the residence, Utilizing the Fish and Wildlife "Housing Inspection Form", prior to the tenant's departure. Upon completion of the inspection, the inspecting authorities and vacating employee shall sign the form. The purpose of this inspection is to assure that the residence and surrounding property are in good condition and full working order. Damage above normally acceptable wear will be corrected through repair or replacement; the expenses incurred shall be borne by the vacating tenant. Upon inspection, an electronic copy of this form will be provided to SPU.

19. Residences shall not be used to engage in any activity normally and reasonably defined as illegal. If such activities are discovered and proven, the tenant will be subject to immediate removal from the residence and their access to the hatchery site will be revoked.

20. Failure to adhere to these written responsibilities may result in disciplinary action.

21. In the case of emergency, no notice is required for responders to enter the residence.

22. If a common gardening area is available, all on-station personnel shall have the opportunity to an equal share of its use. The Regional Hatchery Operations Manager in consultation with the SPU Landsburg Mitigation Coordinator shall determine if applicable and define area(s) to be classed as common garden areas.

23. All tenants are subject to and responsible to meet and comply with all established WDFW Housing Policies and Procedures.

24. SPU and WDFW recommend tenants investigate and consider the purchase of additional "Renters Insurance" for the potential damage and/or loss of personal property while residing in Cedar River Sockeye Hatchery Housing.

25. In the event of a termination of any tenant by WDFW for any reason, including resignation, retirement, or Reduction-In-Force, WDFW shall simultaneously issue a thirty (30) day notice to vacate, and if tenant fails to timely vacate, WDFW shall take all commercially reasonable steps to evict the tenant.

WDFW shall be responsible for tenant compliance with the above specified conditions. Should any tenant fail to comply with any of the above stated conditions, WDFW shall promptly notify SPU. In the event that the failure to comply continues, or the breach of conditions warrants termination of the use of the Residences, or the residence, in SPU's discretion, WDFW shall promptly provide a thirty (30) day notice to vacate to the tenant(s) at issue. If the tenant(s) fail to timely vacate, WDFW shall take all commercially reasonable steps to evict the tenant.

Table _E-1_: Residence Maintenance Responsibility Assignment

MAINTENANCE RESPONSIBILITY		**LMA Hatchery Budget**	
RESIDENCES (Houses and attached Garages)	Housing Tenant	WDFW	SPU
Asphalt Roof Shingles			
-Repair/maintenance			X
-Moss treatment		X	
-Remove leaves/small storm debris	X		
-Cleaning gutters	X		
Exterior Siding, Decks, Porches			
-Major repairs, repaint			X
-Routine cleaning/minor repairs	X		
Sectional Overhead Doors (Garage Doors)			
-Repairs/maintenance			X
-Routine cleaning minor repair	X		
Vinyl Windows			
-Repair/replace			X
-Routine cleaning/minor repair	X		
Flooring (Vinyl and Carpeting)			
-Replacement			X
-Floor/Carpet routine cleaning	X		
Appliances (Stove and Hood, Refrigerator, Clothes Washers, Dish Washer, etc.)			
-Clean/minor repair	X		
-Scheduling service or repair	X		
-Major repair/ replace			X
Furnishings (Window Coverings)			
-Routine cleaning	X		
-Repair or replace			X
Interior Finishes (Paint, other)			
-Repaint, refinish			X
-Routine cleaning, minor repairs/touch-up	X		
Domestic and Service Water Piping			
-Scheduling repairs/maintenance	X		
-Repairs			X
Electric Water Heaters			
-Scheduling repairs/maintenance	X		
-Major repair or replace			X
Sanitary Waste			
-Schedule service and maintenance	X		
-Pump septic system			X

MAINTENANCE RESPONSIBILITY		**LMA Hatchery Budget**	
RESIDENCES (Houses and attached Garages)	Housing Tenant	WDFW	SPU
Plumbing Fixtures			
-Routine cleaning/minor repairs	X		
-Scheduling major repairs	X		
-Major repairs			X
Heating and Ventilating (Furnace and Fans)			
-Replace filters, minor repairs to vents, etc.	X		
-Scheduling service/repairs	X		
-Major repairs			X
Electrical Panels (repair)			X
Interior and Exterior Lighting			
-Repairs			X
-Replace bulbs	X		
Fire Alarm and hatchery flow alarms			
-Scheduling repairs		X	
-Change smoke detector batteries	X		
-Replace smoke detectors		X	
-Major Repairs			X
Communication Lines (Phone, Cable, Security Gate Controls and Intercoms)			
-Install telephone handset, TV and household internet	X		
-Maintain security gate controls			X
Exterior Improvements (Trees, Shrubs, Ground Covering)			
-Normal care (mowing, weeding, pruning, etc)	X		
-Scheduling major care	X		
-Tree removal and other major care			X

LANDSBURG SECURITY AREA OVERVIEW DESCRIPTION

The authority for all security and access ownership decisions surrounding this area resides with the Water Resources Section Manager, currently Paul Faulds. SPU has defined the following described area (as shown, outlined in bold red, on the attached map) as the official Landsburg Security Area:

i. From the NW corner of the Landsburg Main gate parking area running eastward along the northern boundary of the 9 Road (aka "Landsburg Entrance Rd) and then;
ii. around the outside boundary of the Landsburg Staging and Spoils area, and then;
iii. along the northern boundary of the 9 Road to the Cedar River Watershed 9 Rd Entrance gate, and then;
iv. along the eastern boundary of the storage yard area east of the forebay to the Cedar River, and then;
v. across the Cedar river to the forested area immediately east/northeast of the

Sockeye Hatchery Pump Assembly #1, and then;

vi. traveling southwest along the south edge of the pump assembly access road/trail, and then;

vii. around the south side of the former "interim hatchery area" and Spring Pond, and then;

viii. along the foot of the slope immediately south of the Sockeye Hatchery Pump Assembly #3 water supply conveyance pipeline, and then;

ix. along the foot of the slope to the intersection of the Cedar River Watershed 50 Rd and the Pump Assembly #3 access road, and then;

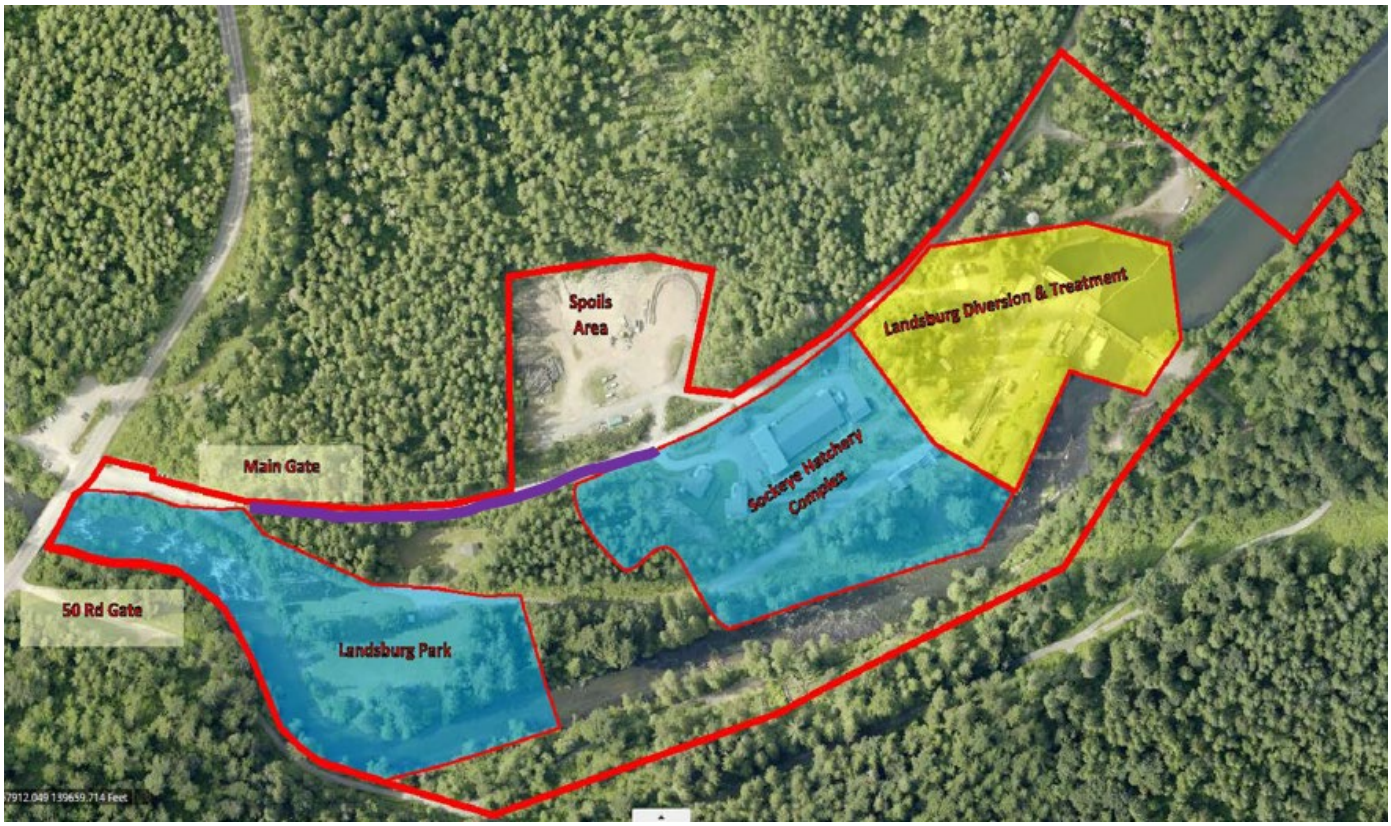
x. along the south bank of the Cedar river to the crossing of the Summit-Landsburg Rd (Hwy), and then;

xi. across the Cedar River immediately east of the Hwy bridge to the point of origin at the Landsburg Main gate parking area.

The level of security protection is not the same for all facilities/areas of the Landsburg Complex. Thus, the overall Landsburg Security Area is divided into "security zones" or sub-areas. There are four distinct sub-areas depicted:

1. Landsburg Raw Water Diversion and Treatment Area (incl. Fish Ladder)
2. Cedar River Sockeye Hatchery Complex
3. Landsburg Park
4. Landsburg Misc. Grounds (all areas not included in the above three)

The area in SPU ownership, but outside of the Landsburg Security Area, as defined above, is considered the Cedar River Watershed, e.g., the 50 Road.



Landsburg Security Area Site Map. Purple line indicates 9 road walking corridor between Hatchery Complex and Landsburg Park.

LANDSBURG MITIGATION AGREEMENT
for the
FISH MIGRATION BARRIER AT THE LANDSBURG DIVERSION DAM

Between

The City of Seattle

and

The State of Washington, Acting Through Its Governor;
and the Department of Fish and Wildlife

and

The United States Department of Commerce,
National Marine Fisheries Service

and

The U.S. Department of the Interior,
Fish and Wildlife Service

TABLE OF CONTENTS

A. GENERAL TERMS AND CONDITIONS

1. The Parties

This Landsburg Mitigation Agreement ("LMA") is entered into by and between the City of Seattle ("the City"), a municipal corporation; the State of Washington, acting through its Governor; and the Washington State Department of Fish and Wildlife ("WDFW"); the United States Department of Commerce, National Marine Fisheries Service ("NMFS"); and the Department of the Interior, Fish and Wildlife Service ("FWS"). For purposes of this LMA, the term "Parties" refers collectively to the City, WDFW, NMFS, and FWS. The terms of this LMA shall be binding upon the respective successors or assigns of each Party.

2. Purpose and Scope

a. The City operates a municipal water supply diversion dam which has blocked approximately 12.4 miles of formerly accessible mainstem anadromous fish habitat on the Cedar River since the turn of the century. In addition, the City is responsible for managing the forest lands that constitute the entire sub-basin for this reach of river. Due to its present high quality condition and the City's commitment through its Cedar River Watershed Habitat Conservation Plan ("HCP") to manage the surrounding riparian and upland forest as an ecological reserve, the 12.4 miles of mainstem fish habitat plus associated tributary fish habitat between Lower Cedar Falls and the Landsburg Dam represents one of the most significant potential freshwater refuges for anadromous fish in our region.

The City cannot allow fish passage to compromise drinking water quality or risk public health. Concern for the water quality effects of post-spawning fish carcasses has been a primary constraint on the decision of which anadromous fish, if any, could be allowed to pass above the water intake. Microbial and nutrient increases caused by the presence of decaying carcasses upstream of the water supply intake could adversely affect drinking water quality. However, the City recognizes the value of the highly protected habitat above the diversion dam for anadromous fish and proposes selective fish passage that is compatible with protection of drinking water quality. For species and/or circumstances in which fish passage must be limited or precluded, the City proposes various levels of funding to support alternative forms of mitigation. In addition, the Parties recognize that fish habitat in the lower Cedar River downstream of the City's ownership boundary has been fundamentally degraded by rerouting, land development, bank armoring, and regulation of stream flows, but that many opportunities exist for habitat restoration downstream of Landsburg.

In the past, strong concerns have been expressed by the City and by state and federal drinking water regulators about the human health risks associated with the passage of large numbers of salmon into the municipal water supply above the Landsburg diversion dam. Spawning carcass biomass (and therefore relative run

size) is an important factor when considering the impact of anadromous fish reintroduction above Landsburg.

The City conducted a careful analysis of the potential impact of salmon spawning carcasses on drinking water quality. This assessment showed that, while passage of the mass-spawning sockeye above the water intake would compromise drinking water quality and public health, passage of coho, chinook, and steelhead above the intake was unlikely to present drinking water problems as long as the potential impacts of such passage on drinking water are carefully monitored, and as long as passage can be controlled if any significant problems develop.

b. The primary objectives of this mitigation agreement are to (1) Implement biologically sound, short and long term solutions that help provide for the recovery and persistence of healthy, harvestable runs of sockeye, coho, and chinook salmon and steelhead trout in the Cedar River; (2) Maintain a safe, high quality drinking water supply; (3) Implement restoration alternatives that have a high likelihood for success and that provide substantial value for target resources; (4) Provide fish passage over the Landsburg Diversion Dam, consistent with water quality protection, that is coordinated with run recovery, biological need, water supply operations, and facility maintenance requirements; (5) Coordinate with and support other compatible fish protection and restoration activities in the basin to maximize total benefits to fisheries resources within an ecosystem context; and (6) Design restoration measures in a manner that satisfies any mitigation obligations the City may have for the Diversion Facilities (as defined in A.2.c.) as defined by existing state and federal law and pursuant to City ordinance and initiatives.

c. The City commits, as specified in this agreement, to long-term measures to help restore anadromous fish runs and mitigate for the blockage at Landsburg Dam, including fish passage for coho, chinook, and steelhead; artificial production facilities as alternative mitigation to passage for sockeye; and habitat restoration below Landsburg Dam. In other agreements which, like this one, are part of the City's Cedar River Watershed Habitat Conservation Plan under the federal Endangered Species Act, the City addresses streamflows and habitat protection and rehabilitation above Landsburg Dam. In particular, the City commits to provide for the planning, design, construction and operation of fish passage and production facilities as specified in sections B through E. The term "Diversion Facilities" refers to the City's Landsburg Diversion Dam and water supply intake, and the water supply pipeline crossing at river mile 21.4 of the Cedar River, plus all appurtenant pipelines and related structures, as these facilities presently exist or may hereafter be reconstructed. Changes to the Diversion Facilities or to other facilities in the City's water supply system shall not change the Parties' commitments set forth in this LMA.

d. The Parties agree that the City's compliance with the obligations contained in this LMA, as specified herein, shall, during the term of

this agreement, fully satisfy any responsibilities that each Party may contend the City has under existing state and/or federal law with respect to mitigation for the blockage of fish passage at Landsburg and the provision of fish guards (screens) on the water intake at the Diversion Facilities. The LMA does not include instream flows, which are addressed by a different agreement.

e. There is established a Cedar River Anadromous Fish Committee ("the Committee" or "CRAFC") to aid in communication among the Parties and to advise the City concerning implementation of this agreement. The membership and role of this group is further described in section F of this agreement. The Committee shall be formed and begin operation not later than ninety (90) days after the Effective Date of this agreement.

3. Effective Date

This LMA shall become effective on the first day after both of the following conditions have been met ("Effective Date"):

a. all Parties sign the LMA, and

b. the City, USFWS, and NMFS sign an Implementation Agreement ("IA") for the HCP.

4. Term

The term of this LMA shall be 49 years beyond the end of HCP Year 1, as defined in subsection A.8, subject to extension upon written agreement of all Parties.

5. Amendment

This LMA may be amended by mutual agreement of all Parties. Any amendment shall be in writing and signed by all Parties.

6. Funding and Accomplishment of Work

a. The City agrees to make available for LMA implementation the full amounts of money specified in Exhibit A (totaling $36,927,000) for each of the four Cost Categories of (1) "Coho, chinook, and steelhead mitigation," (2) "Sockeye mitigation," (3) "Coho, chinook, and steelhead research and monitoring," and (4) "Sockeye research and monitoring." This commitment applies regardless of whether cost savings are achieved on individual activities. Except as provided in section B.2.a, the City will not be required to exceed these cost caps for each of these Cost Categories, unless it agrees to do so through a written amendment, or the Parties have agreed to extend the term of this agreement as provided for in A.4. Exhibit A, attached to this agreement and incorporated by reference, shows the maximum expenditures

which could be required of the City under this agreement, for each HCP year. Unspent funds from previous years can be carried over and added to annual maximums in succeeding years. Amounts actually spent in any given year will vary depending on the progress of various activities.

b. All dollar amounts in this LMA are represented in 1996 dollars. These figures will be adjusted annually each full year after 1996 for inflation or deflation, based on the "Consumer Price Index for All Urban Consumers" published by the Bureau of Labor Statistics of the U.S. Department of Labor. If this index is discontinued or becomes unavailable, a comparable index will be designated by the Parties. The inflation adjustment established in this subsection shall also apply to the caps on City-initiated fund transfers established in subsection A.7, below.

c. Except as otherwise provided in this agreement, and subject to applicable laws and regulations, the City retains authority to determine how LMA activities will be accomplished, including who will conduct the actual work. However, the City will consider cooperative agreements with any of the Parties as a means of accomplishing some activities, including the use of the Parties' staff, as allowed under law. The City does not, by this provision, assert authority to establish targets, timing, or location for releasing, planting, or placing fish in state waters from any production facility.

d. All Parties shall support the efficient and effective use of funds to accomplish the goals, objectives, and elements of the LMA within the overall cost cap and fund transfer limitations described below.

e. Nothing contained in this agreement is intended to prevent the Parties from adding additional features to a facility, or otherwise improving its functioning for the long-term benefit of fish resources, through cost sharing or similar arrangements.

7. Transfers of Funds

Unless otherwise specified in this agreement no transfers of funds between the Cost Categories identified above in subsection A.6.a. may occur without a written amendment to this agreement (e.g., City can't transfer funds from "sockeye mitigation" to "coho, chinook and steelhead mitigation"). However, the City shall have authority to make transfers of funds among activities within each of the four Cost Categories (e.g., City can transfer funds within "sockeye mitigation" cost category from interim mitigation to hatchery construction), provided such transfers (1) do not exceed $50,000 for capital (construction) projects or $15,000 for operating activities; (2) don't exceed more than three transfers per year in any one cost category; (3) are described in annual reports to the Committee; (4) do not affect the City's ability to accomplish agreed-upon elements of the HCP; and (5) do not compromise the overall purposes and objectives of the HCP, including the LMA. Transfers of funds greater than

$50,000 (capital) or $15,000 (operating) within each Cost Category can be made only with agreement of all Parties.

8. Convention Adopted for Schedule Commitments

The schedule commitments in this LMA are expressed in terms of HCP Years. "HCP Year 1" shall mean the period between the Effective Date and the end of the following full calendar year. "HCP Year 2" and all succeeding HCP Years shall coincide with the calendar years that follow the end of HCP Year 1.

9. Resolution of Disputes

a. The Parties recognize that disputes concerning implementation of this LMA may arise from time to time. It is the intention of the Parties to work together in good faith to resolve any such disputes through the procedures set forth below. Although the Parties prefer the use of alternative dispute resolution to the extent practicable, it is not a prerequisite to initiation of judicial proceedings as provided for under A.12.

b. Any Party wishing to resolve a dispute under this LMA shall notify the other Parties by setting forth its position in writing, including a specific description of the situation it wishes to address, the reasons why it believes certain actions or conditions constitute a violation of the LMA (if that is the contention), and the action it wishes the Parties to take. Any other Party may submit to all of the Parties a written response within 30 days.

c. Following this exchange of written statements, any Party through a policy-level administrator may invoke review of the dispute by contacting other Parties' policy-level administrators and arranging for a suitable telephone or in-person conference.

d. In the event that the policy-level administrators fail to resolve the dispute, any Party may request mediation, which shall take place only if agreed to by all of the Parties. The mediator shall be selected by the Parties within 10 days of the request, and the process concluded within an additional 30 days, unless the Parties otherwise agree. Costs shall be shared equally by all Parties.

10. Force Majeure

a. The term "force majeure," as used in this document, means events that are beyond the reasonable control of, and that did not occur through the fault or negligence of, the City or any entity controlled by the City, including its contractors and subcontractors to the extent they are carrying out authorized activities, including but not limited to: acts of God; sudden actions of the elements, including fire; or actions of Congress, the Washington State Legislature, federal or state agencies or courts, or an action of a local jurisdiction

other than the City that prevents the City from performing its obligations under the terms of this agreement.

b. Force majeure procedures. In the event that the City is wholly or partially prevented from performing obligations under this agreement because of a force majeure event, the City will be excused from whatever performance is affected by such force majeure event to the extent so affected, and such failure to perform will not be considered a material breach of this agreement, provided that

(1) the City uses its best efforts to avoid and mitigate the effects of any delay;

(2) the suspension of performance is of no greater scope and no longer duration than is reasonably required by the force majeure;

(3) the City notifies the Parties orally within a reasonable time (normally not to exceed 48 hours) after becoming aware of any event that the City contends constitutes a force majeure, and in writing within seven (7) calendar days after the event. Such notice will: identify the event causing the delay or anticipated delay; estimate the anticipated length of delay; state the measures taken or to be taken to minimize the delay; and estimate the timetable for implementation of the measures; and

(4) when the City is able to resume performance of its obligations, it provides the Parties written notice to that effect.

11. Termination by the City

The City may voluntarily terminate this agreement, provided it gives all other Parties written notice of its intent to terminate, explaining its reasons therefor, at least two years in advance of termination, and provided further that no such notice may be given in advance of the end of HCP Year 4.

12. Remedies

Each Party shall have all remedies otherwise available in equity, including specific performance, to enforce the terms of this agreement. No Party shall be liable in damages to any other Party or other person for any breach of this agreement, any performance or failure to perform a mandatory or discretionary obligation imposed by this agreement, or any other cause of action arising from this agreement.

B. INTERIM MEASURES FOR STEELHEAD TROUT, AND COHO, CHINOOK, AND SOCKEYE SALMON

1. General

The City will make available the sum of $1,744,000 for the implementation of interim mitigation measures as described in this section B for the four anadromous fish species ($720,000 for steelhead trout, coho and chinook salmon mitigation, and $1,024,000 for sockeye salmon) until long-term mitigation measures are in place. The specific measures, implementation schedules, and cost scheduling will be as identified below unless modified by agreement of the Parties.

2. Interim Measures for Steelhead Trout, and Coho and Chinook Salmon

a. The City will provide up to $90,000 per HCP year for interim mitigation measures for steelhead trout, and coho and chinook salmon, beginning in HCP Year 1 and continuing until the end of HCP Year 8. In the event that completion of construction of any of these facilities is delayed beyond the end of HCP Year 8, the provisions of section C.2.c, C.3.c, and C.4.c shall govern continued mitigation measures. Notwithstanding any other provision of this agreement, if interim mitigation must be continued beyond HCP Year 8 for one or more of these facilities, the differential cost of continuing such interim mitigation, over what would otherwise be the cost of operating the permanent facilities, shall not be charged against the overall HCP cost cap, but shall be borne by the City independently of such cost cap.

b. The interim mitigation funds shall be used, with agreement of all Parties, to accomplish the following: i) fund the implementation of life history, genetic, demographic and/or ecological studies to fill critical information gaps; ii) implement emergency supplemental production programs designed to help sustain and rebuild the populations in a manner that helps ensure their long-term reproductive fitness, and capacity to adapt to changing environmental conditions; and/or iii) other measures deemed appropriate by the Parties to achieve the objectives of the LMA. If the Parties fail to agree on the form of interim mitigation within two years of initiating discussion of the issue, then the City shall spend the funds for fish habitat acquisition, restoration, or enhancement within the Lake Washington Basin.

3. Interim Measures for Sockeye Salmon

The City will provide up to $256,000 per HCP Year for interim sockeye mitigation. Unless otherwise agreed to by the Parties, this funding is dedicated to the operation of the existing interim sockeye salmon hatchery facility at Landsburg, beginning in HCP Year 1 and continuing until the end of HCP Year 4

or until the proposed new hatchery facilities are completed, whichever is sooner, and subject to the provisions of D.2.f. The interim sockeye hatchery is owned by the City, which will remain responsible for assuring its continued operation, as required by the terms of this agreement. The facility will be operated by WDFW pursuant to a Memorandum of Agreement from July 1998 until July 2003. In the event that the replacement hatchery is not constructed by July 2003, the City will operate the hatchery, enter into a MOA with WDFW, or contract with another party to operate the hatchery.

C. LONG-TERM MEASURES FOR STEELHEAD TROUT, AND COHO AND CHINOOK SALMON

1. General

a. The Parties wish to enable anadromous fish to fully utilize the river habitats above Landsburg Dam, insofar as possible without negatively impacting safe drinking water. The City conducted a careful risk assessment of potential salmonid passage over Landsburg Dam and determined that, while passage of the mass-spawning sockeye above the water intake would compromise drinking water quality and public health, passage of the much less numerous coho, chinook, and steelhead above the intake was unlikely to present drinking water problems as long as the potential impacts of such passage on drinking water are carefully monitored, and as long as passage could be limited if any problems occur. Therefore, as further specified in Exhibit A, the City will provide up to $8,178,000 for the design, permitting (including any construction mitigation), construction, and operation of fish passage and protection facilities as described in subsections C.2 through C.4. Such expenditures, as well as the dates for initiation or completion of the activities specified below, are subject to the City's ability to obtain any necessary permits and to successfully complete any requisite review process under the State Environmental Policy Act (SEPA) and the National Environmental Policy Act (NEPA) within the cost schedules and time frames described in this section C.

b. Notwithstanding other provisions of this agreement, the City will create a special Design Contingency Fund of $583,000 in addition to the amounts specified in the HCP Cost Categories. This contingency amount is in addition to the 20% contingency assumed in the conceptual design cost estimates. This Fund shall be made available for construction of any of the fish passage facilities identified below, in the event that the City determines, following a value engineering process at the 30% design phase, that such additional sums are needed to achieve the objectives of this agreement. Such funds shall not be available to fund any changes to facility designs that alter the intent of such facilities or expand their purposes beyond those stated in this agreement.

c. Once any one of the fish passage and protection facilities described in subsections C.2 through C.4 is completed, the City will provide up to

$50,000 per year to operate and maintain said facilities, for each year of operation for the duration of this LMA. Money for this activity is included in the total identified in subparagraph C.1.a.

d. The Parties will agree on facility design, construction, and operation, with advice from the Committee as provided in section F.

e. Once fish passage facilities are completed, all native fish species in the Cedar River, with the exception of sockeye salmon, will be allowed access to the municipal watershed through the fish ladders, as provided herein. The City will allow up to a total biomass of 46,500 pounds (e.g. about the equivalent of 1,000 chinook and 4,500 coho salmon) of adult chinook and coho salmon per year to pass into the habitat above the Landsburg Diversion Dam, provided the City has determined such action does not pose a risk to drinking water quality and public health. There will be no limit on passage of naturally produced steelhead trout. The City will monitor the effects of fish passage on drinking water quality and may increase or decrease the numbers of fish passed, based on the results of such monitoring, as described in subsection E.2. Prior to instituting measures to decrease fish passage, the City will select and consult with one or more independent experts, who will evaluate the situation and the available options, and will prepare a report with a recommendation as to whether fish passage can occur without posing a risk to drinking water quality and public health. The City will review the report with the Committee, and will provide an explanation for its decision regarding fish passage. In the event that the City decides to limit the numbers of fish allowed to pass above the diversion, it will do so pursuant to section E.2.e.

f. If, prior to construction of any of the fish passage and protection facilities provided for in this section, the City determines that it is unable to obtain the necessary permits, it shall so advise the Parties. If, after consultation with the Committee, all of the Parties agree that alternative mitigation should be pursued in lieu of one or more of the proposed facilities, then the City will commit remaining construction, operation, and monitoring funds, at a level, and according to a schedule that does not exceed the total of its original commitments, to alternative mitigation. In the event that the Parties cannot agree on alternative mitigation by two years after they begin deliberations on the subject, these monies shall be spent by the City for fish habitat acquisition, restoration, or enhancement within the Lake Washington Basin. Obligations for interim mitigation funding under subsections C.2.c, C.3.c, and C.4.c shall cease upon initiation of such alternative mitigation.

2. Upstream Passage Facilities

a. The City will provide up to $2,011,000 for the design, permitting (including any construction mitigation), and construction of upstream adult fish passage facilities at the Diversion Facilities.

b. The City will initiate design of upstream fish passage facilities immediately after the effective date of this agreement, with a target date for completing construction by the end of HCP Year 3, dependent on successful completion of permitting and environmental review.

c. If, due to a force majeure event or the City's inability to successfully complete any required environmental review or obtain the necessary permits, construction activities are not completed by the end of HCP Year 8, the City will provide interim mitigation funds at a rate of up to $30,000 per year (1/3 the amount of the total annual interim mitigation funds for steelhead, coho and chinook), pro-rated in proportion to the fraction of each year that elapses between the beginning of the HCP year and the date construction is completed. This extended interim mitigation will cease in the event that the Parties decide that alternative mitigation be pursued, as provided for in C.1.f.

3. Downstream Passage Facilities

a. The City will provide up to $958,000 for the design, permitting (including any construction mitigation), and construction of downstream fish passage facilities at the Diversion Facilities.

b. The schedule for design and construction of downstream passage facilities shall be the same as for upstream passage facilities, as described in subsection C.2.b.

c. If, due to a force majeure event or the City's inability to successfully complete any required environmental review or obtain the necessary permits, construction activities are not completed by the end of HCP Year 8, the City will provide interim mitigation funds at a rate of up to $30,000 per year (1/3 the amount of the total annual interim mitigation funds for steelhead, coho and chinook), pro-rated in proportion to the fraction of each year that elapses between the beginning of the HCP year and the date construction is completed, or until the Parties decide that alternative mitigation be pursued, as provided for in C.1.f.

4. Fish Screening Facilities

a. The City will provide up to $2,859,000 for the design, permitting (including any construction mitigation), and construction of screening facilities to minimize any entrainment of juvenile salmonids into the City's drinking water intake at the Diversion Facilities and to transport juvenile fish safely from the area upstream of the screens back to the river downstream of the diversion dam.

b. Design of these facilities will be initiated immediately after the effective date of this agreement, with a target date for completion by the end of HCP Year 3, dependent on successful completion of permitting and environmental review.

c. If the construction of the fish screening facilities has not been completed by the end of HCP Year 8, the City will provide interim mitigation funds at a rate of up to $30,000 per year (1/3 the amount of the total annual interim mitigation funds for steelhead, coho and chinook), pro-rated over the fraction of each year that elapses until such time as construction is completed. This extended interim mitigation will cease in the event that the Parties decide that alternative mitigation be pursued, as provided for in C.1.f.

D. LONG-TERM MEASURES FOR SOCKEYE SALMON

1. General

a. To minimize and mitigate any long-term effects of the migration barrier created by the Diversion Facilities on sockeye salmon, the City will provide up to $23,347,000 for the design, permitting (including construction mitigation), construction, and operation of a sockeye hatchery to replace the interim hatchery at Landsburg (as described in subsection D.2) and for habitat restoration and/or protection in the lower Cedar River (as described in subsection D.3). Such expenditures, as well as the dates for initiation or completion of the activities specified below, are subject to the City's ability to successfully complete the requisite review process under the State Environmental Policy Act (SEPA) and the National Environmental Policy Act (NEPA) and obtain any necessary permits within the cost schedules and time frames described in this section D.

b. The Parties, in consultation with the Committee, will oversee the long-term sockeye mitigation program, including design, construction, and operation of the replacement hatchery, including reviewing monitoring results and making adjustments in the program as necessary to meet program objectives, as described in Part E. The Parties will ensure that a comprehensive public involvement and environmental review process for the long-term hatchery program is carried out prior to the end of HCP Year 3, when the Parties will make final decisions regarding the design, capacity, operating guidelines, and adaptive management features of the program. This process will be paid for by the City, subject to the provisions of section A.6. Once the Parties have approved the capacity, design, operating guidelines, and adaptive management program, the City will arrange for the construction of the replacement sockeye hatchery, and will own the hatchery. The City will operate or contract with WDFW and/or another party to operate the replacement hatchery during the term of this agreement. Operations will be conducted pursuant to the monitoring and adaptive management provisions of section E, as well as other terms of this agreement.

c. If at any time all Parties to this LMA agree that the replacement sockeye hatchery is no longer appropriate, then the City will commit

any remaining construction, operation and/or monitoring funds to alternative mitigation at a level and according to a schedule that does not exceed the total of its original funding commitments for the sockeye fry production program. The form of the alternative mitigation shall be as agreed by the Parties, but in the event that no agreement is reached by two years after the Parties begin deliberations on the issue, the City shall spend any remaining funds for fish habitat acquisition, restoration, or enhancement in the Lake Washington Basin.

2. Replacement Sockeye Hatchery

a. The City will provide a maximum of up to $7,678,000 for the design, permitting (including construction mitigation), and construction of a replacement sockeye salmon hatchery, and associated broodstock collection and fry release facilities capable of producing up to 34,000,000 sockeye fry per year. These facilities are described more fully in section 4.3 of the HCP. In the event that the City is able to construct these facilities at a lower cost, the remaining funds may be spent for the benefit of any or all anadromous fish species as determined by the Parties, notwithstanding any other provision of this agreement, including section A.7.

b. As part of the planning and design phase for the sockeye hatchery in HCP Years 1 through 3, the City will make available up to $200,000 to support development and evaluation of measures to improve sockeye broodstock collection practices. Development and evaluation of these measures will be overseen by the Parties, in consultation with the Committee, in an effort to improve the degree to which the interim and long term broodstock collection practices will meet the dual objectives of: (1) capturing a sufficient number of brood fish in a manner that helps insure the long term reproductive fitness, genetic diversity and adaptive capacity of the Cedar River sockeye population; and (2) avoiding and minimizing potential detrimental impacts on naturally reproducing salmonids in the Cedar River.

c. In HCP Year 1 the City will provide $32,000 for the development of guidelines to direct the design, construction, operation and monitoring phases of the sockeye fry-production program, as further described in subsection E.3.b.

d. Design of the replacement sockeye hatchery will be initiated by the City in HCP Year 1. After completing the review process described in subsection D.1.b, the Parties shall agree in Year 3 as to the design, capacity, operating guidelines, and adaptive management program, developed pursuant to subsection E.3.b. The replacement hatchery facilities will be operational by September 1 of HCP Year 5, dependent on timely completion of permitting and environmental review.

e. Once the replacement sockeye hatchery is constructed, the City will provide up to $300,000 per year to operate and maintain the facilities for

the term of this LMA. In the event that the City is able to operate these facilities at a lower cost, the remaining funds may be spent for the benefit of any or all anadromous fish species as directed by the Parties, notwithstanding any other provision of this agreement, including section A.7.

f. If, due to a force majeure event or the City's inability to successfully complete any required environmental review or obtain the necessary permits, the facilities have not been completed by September 1 of HCP Year 5, the City will continue to provide funding for the existing interim facility at a level of $256,000 per year for each additional year beyond HCP Year 5 in which construction of the replacement hatchery has not been completed by September 1. In addition, the City shall make available an additional $44,000 for each such additional year, for mitigation to be determined by agreement of the Parties. These additional expenditures will be subtracted from the remaining funds in this Cost Category, and the obligation for such expenditures will cease in the event that the Parties establish alternative mitigation measures pursuant to subsection D.1.c, above.

3. Lower Cedar River Habitat Restoration/Protection

The City will provide up to $1,637,000 in HCP Years 2 through 5 to acquire, restore, and/or protect habitat for any or all anadromous fish, especially chinook salmon, in the lower Cedar River outside the City's current property ownership boundary as directed by the Parties, in consultation with the Committee. Any unspent funds may be spent in subsequent years. This money shall be in addition to any monies reallocated to habitat restoration/protection from other activities.

E. MONITORING AND ADAPTIVE MANAGEMENT

1. General

a. The Parties agree that mitigation measures contained in this LMA are intended to benefit the fishery resources of the Cedar River by protecting, improving and increasing available habitat and fish production. The Parties recognize the importance of monitoring mitigation measures and the conditions of the fish populations to assure that the purposes of this LMA and the HCP are met. The Parties also acknowledge that available information on certain complex ecological, genetic, and demographic processes is not complete. Therefore, the City, in cooperation with the other Parties, will sponsor and conduct certain studies, as specified in this section E, and act on the results as indicated to manage anadromous fish mitigation in an adaptive fashion. The Parties are committed to use adaptive management to address critical questions as they arise, and make changes in management based on the results of monitoring to meet the specific objectives of the program. The details of adaptive management

for the sockeye mitigation program will be developed prior to the review and decision described in subsections D.1.b and D.2.d.

b. Except as otherwise provided, changes in all major aspects of study planning, implementation, and coordination with other related studies shall, within the indicated cost constraints, be subject to the approval of the Parties, in consultation with the Committee, which shall meet as frequently as appropriate to address study requirements. The City shall use its best efforts to complete final study reports no later than one year after completion of the respective studies.

2. Evaluation of Fish Passage and Protection Facilities

a. Fish passage and protection facilities will be provided under this agreement to minimize any effects of the present migration barrier created by the Diversion Facilities on steelhead trout, and coho and chinook salmon. Subject to applicable permitting requirements, generally accepted standards and designs will be used to design, construct, and operate these facilities. To ensure that the mitigation measures are performing as intended, the City will provide the opportunity for the Parties to conduct a full final inspection of the completed facilities and will sponsor specified studies as described in this subsection E.2 to evaluate and monitor system performance.

b. The City will provide up to a total of $110,000 during the first 12 years after completion of the upstream fish passage facilities at the Diversion Facilities to monitor the rate of adult fish passage, and to better understand run timing, the rate of passage, and the rate at which the populations recolonize previously blocked habitat.

c. Once the fish-screening facilities are constructed upstream of the drinking water intake, the City will provide up to a total of $15,000 to perform hydraulic analyses to refine flow characteristics of the screens and demonstrate conformity with hydraulic parameters established by the Parties during the design of the facility.

d. The City will provide up to $10,000 per year for a total of up to 6 years to measure the effects on drinking water of allowing anadromous fish above the Diversion Facilities. The first year of measurement will occur prior to the construction of the fish passage facilities to establish baseline parameters for selected water quality criteria. The remaining 5 years of measurement will be conducted in HCP Years 8, 10, 15, 20 and 25. If the results of the monitoring program indicate that the biomass of fish allowed to pass above the Diversion Facilities should be adjusted either upward or downward, based on drinking water quality or public health concerns, the City may act as provided in paragraph C.1.e, above, to establish new limits for fish passage. Under no circumstances will the number of fish passed above the Diversion Facilities be allowed to pose a risk to drinking water quality and public health.

e. If, to adequately protect drinking water quality, it becomes necessary to limit the biomass of adult fish allowed to pass above the Diversion Facilities below the biomass specified in C.1.e, the City will resume interim mitigation funding until such time as full fish passage can be restored. Under such circumstances, the City will provide up to $30,000 per year for each species that must be limited, prorated in proportion to the reduction in coho and chinook biomass below the biomass specified in C.1.e. The Parties, in consultation with the Committee, shall agree on the form of such mitigation. If the Parties fail to agree on the form of such mitigation within two years of initiating discussion of the issue, then the City shall spend the funds for fish habitat acquisition, restoration, or enhancement within the Lake Washington Basin.

3. Evaluation of the Sockeye Fry-production Program

a. Several key objectives have been established for the sockeye fry-production program. First, the replacement sockeye hatchery should be designed to produce up to 34 million fry, unless the Parties determine that a lower production capacity is appropriate. Second, the program should be designed to produce fry that are equivalent in quality to those that are produced naturally. Third, the program should avoid or minimize detrimental impacts on the reproductive fitness and genetic diversity of naturally reproducing sockeye salmon populations in the Cedar River and Bear Creek subbasins. Fourth, the program should avoid or minimize detrimental ecological impacts on native salmonids throughout the watershed.

b. During HCP Year 1, the Parties, in consultation with the Committee and consistent with their respective authorities and other applicable laws, shall develop guidelines to govern the design, construction, operation, and monitoring phases of the sockeye fry production program. The guidelines will include procedures for developing and modifying annual production targets.

c. The Parties recognize that adaptive response to emerging issues is desirable in management of the hatchery, and therefore have established a monitoring program to evaluate hatchery operations. The Parties recognize further that circumstances may occur which could cause them to modify expected outcomes or which could result in an inability to achieve production objectives. The City shall not be responsible for such circumstances or the results thereof.

d. To further ensure that the program is successful, the City will provide up to $3,473,000, as outlined in Exhibit A, to monitor the performance and potential impacts of the sockeye fry production program. Decisions regarding interpretation of monitoring results, alterations in the monitoring program, and alterations in production program operations will be made by the Parties, except as specified elsewhere in this LMA.

e. If, based on the monitoring results, the Parties, in consultation with the Committee, conclude that certain components of the program implementation are not meeting program objectives (stated in paragraph E.3.a, above), then the Parties, by agreement, may alter the program to meet those objectives, provided such alterations do not result in expenditures earlier than provided for nor change the total dollar amount allocated to the sockeye salmon mitigation program.

f. If the sockeye fry-production program is discontinued according to the provisions set forth in subsection D.1.c. during the term of this LMA, or if the City is unable to complete construction of the replacement sockeye hatchery, then the City will commit remaining monitoring funds, at a level not to exceed the total of its original commitments, to alternative mitigation as directed by the Parties pursuant to subsection D.1.c.

F. CEDAR RIVER ANADROMOUS FISH COMMITTEE

1. Membership

The Cedar River Anadromous Fish Committee shall have 10 members, as follows: one for each signatory to this LMA, except the Governor; one for King County, contingent on the County's written endorsement of the HCP; one for the Muckleshoot Indian Tribe (if they are not a signatory); one representing the group of organizations that were signatory to the June 11, 1999 Notice of Appeal of the Final EIS for the HCP; and three other stakeholders selected by unanimous agreement of the Parties.

2. Committee Operation

The Committee shall be formed and begin operation not later than ninety (90) days after the effective date of this agreement. Meetings of the Committee may be in person or by telephone or by such other method as may be acceptable to the members. The Committee may, by unanimous agreement of the Parties plus a majority vote of other members, adopt by-laws to govern administrative matters such as notices, record-keeping, frequency of meetings, and mechanisms for convening the Committee. The City will chair the Committee and provide administrative support for its operation.

3. Committee Role

The Committee will provide advice and consultation to the City concerning the implementation of this agreement, and shall serve as a forum for coordination and communication among the members of technical information on the status and condition of anadromous fish stocks in the Cedar River and the implementation and oversight of interim and long-term mitigation measures for these species.

G. COMMITMENTS TO THE CITY BY THE OTHER PARTIES

1. Commitments by the State of Washington

a. The State of Washington, acting through its Governor and its WDFW, agrees that the City, if it is in substantial compliance with the terms of the LMA, including fully funding the annual operations of the facilities to be constructed under the terms of this agreement in the amounts set forth in Exhibit A, is in compliance with all requirements of existing state law with respect to the blockage of fish passage at Landsburg and the provision of fish guards (screens) on the water intake. "Substantial compliance" means compliance with all essential terms and conditions of the LMA in all respects material to achieving the objectives of the LMA. The State, acting through its Governor and its WDFW, releases the City during the term of this agreement from any liability to the State that the State contends may exist under existing state law in connection with the blockage to fish passage resulting from the Diversion Facilities, or in connection with operation of the water intake, except instream flows, which are covered by a separate agreement. Further, the State, acting through its Governor and its WDFW, releases the City from any and all retrospective claims for liability prior to the execution of this agreement under existing state law for blockage to fish passage resulting from the Diversion Facilities and for operation of the water intake if the agreement is not terminated by the City prior to the term as stated in A.4.

b. The State, acting through its Governor and its WDFW, agrees that, under existing state law and during the term of this agreement, any City actions to maintain and improve the Diversion Facilities would not be grounds to require any further mitigation for the blockage of fish, as long as the Diversion Facilities and any improvements constructed as part of this LMA remain operable. This paragraph is not intended to excuse any violations of permits applicable to Diversion Facilities.

2. Commitments by the Federal Parties

a. NMFS and USFWS agree that the mitigation measures set forth in this LMA, in combination with the other measures set forth in the City's HCP, sufficiently minimize and mitigate for take of Covered Species to meet all requirements of the Endangered Species Act, and entitle the City to issuance of an incidental take permit under the procedures set forth in the IA.

b. NMFS and USFWS agree that any City actions to maintain and improve the Diversion Facilities would not be grounds to require any further mitigation for blockage of fish or operation of the water intake, as long as the facilities constructed as part of this agreement remain operable, and provided that any such maintenance or improvement does not affect Covered Species to a significantly greater degree than that analyzed under the HCP.

IN WITNESS WHEREOF, the City of Seattle has caused this Landsburg Mitigation Agreement to be executed by its Mayor pursuant to Resolution 29977, as amended by Resolution 30091, and other Parties have executed the same pursuant to applicable legal authorities.

THE CITY OF SEATTLE

By: Paul Schell
Paul Schell, Mayor

Date: 4/21/00

THE STATE OF WASHINGTON

By: Gary Locke
Gary Locke, Governor

Date: 4-21-2000

By:
Jeff Koenings, Director
Department of Fish and Wildlife

Date: 4/21/2000

U.S. DEPARTMENT OF COMMERCE,
NATIONAL MARINE FISHERIES SERVICE

By: William W. Stelle Jr.
William W. Stelle Jr., Regional Administrator

Date: 4/21/00

DEPARTMENT OF THE INTERIOR
U.S. FISH AND WILDLIFE SERVICE

By:
Tom Dwyer, Deputy Regional Director

Date: 4/21/2000

EXHIBIT A

to the

LANDSBURG MITIGATION AGREEMENT

LANDSBURG DAM MITIGATION AGREEMENT COSTS TABLE

LANDSBURG DAM MITIGATION AGREEMENT COSTS

ALL SPECIES

STEELHEAD, COHO, AND CHINOOK MITIGATION*, RESEARCH AND MONITORING

SOCKEYE MITIGATION, RESEARCH, AND MONITORING

HCP Year	Interim Mitigation	Diversion & Pipeline Ladders	Downstream Fish Passage	Intake Screens	Passage O&M**	Passage Monitoring***	Screen Monitoring****	Total Mitigation + Res. & Mon.	Interim Mitigation	Hatchery Construction	Brood Collection R & D	Hatchery O&M	Habitat Restoration	Monitoring Phase 1&2	Total Mitigation + Res. & Mon.	GRAND TOTAL MITIGATION & RES. & MON
1	$ 90,000	$ 172,000	$ 83,000	$ 246,000		$ 10,000		$ 601,000	$ 128,000	$ 509,000	$ 100,000			$ 200,000	$ 937,000	$ 1,538,000
2	$ 90,000	$ 832,000	$ 396,000	$ 1,182,000				$ 2,500,000	$ 256,000	$ 318,000	$ 100,000		$ 98,000	$ 175,000	$ 947,000	$ 3,447,000
3	$ 90,000	$ 832,000	$ 396,000	$ 1,182,000				$ 2,500,000	$ 256,000	$ 319,000			$ 147,000	$ 175,000	$ 897,000	$ 3,397,000
4	$ 90,000	$ 175,000	$ 83,000	$ 249,000	$ 50,000	$ 50,000	$ 15,000	$ 712,000	$ 256,000	$ 3,282,000			$ 1,392,000	$ 175,000	$ 5,105,000	$ 5,817,000
5	$ 90,000				$ 50,000	$ 5,000		$ 145,000	$ 128,000	$ 3,282,000		$ 300,000		$ 124,000	$ 3,834,000	$ 3,979,000
6	$ 90,000				$ 50,000	$ 5,000		$ 145,000				$ 300,000		$ 124,000	$ 424,000	$ 569,000
7	$ 90,000				$ 50,000	$ 5,000		$ 145,000				$ 300,000		$ 124,000	$ 424,000	$ 569,000
8	$ 90,000				$ 50,000	$ 15,000		$ 155,000				$ 300,000		$ 124,000	$ 424,000	$ 579,000
9					$ 50,000	$ 5,000		$ 55,000				$ 300,000		$ 99,000	$ 399,000	$ 454,000
10					$ 50,000	$ 15,000		$ 65,000				$ 300,000		$ 99,000	$ 399,000	$ 464,000
11					$ 50,000	$ 5,000		$ 55,000				$ 300,000		$ 99,000	$ 399,000	$ 454,000
12					$ 50,000	$ 5,000		$ 55,000				$ 300,000		$ 99,000	$ 399,000	$ 454,000
13					$ 50,000	$ 5,000		$ 55,000				$ 300,000		$ 12,000	$ 312,000	$ 367,000
14					$ 50,000	$ 5,000		$ 55,000				$ 300,000		$ 12,000	$ 312,000	$ 367,000
15					$ 50,000	$ 15,000		$ 65,000				$ 300,000		$ 12,000	$ 312,000	$ 377,000
16					$ 50,000	$ 5,000		$ 55,000				$ 300,000		$ 12,000	$ 312,000	$ 367,000
17					$ 50,000			$ 50,000				$ 300,000		$ 12,000	$ 312,000	$ 362,000
18					$ 50,000			$ 50,000				$ 300,000		$ 12,000	$ 312,000	$ 362,000
19					$ 50,000			$ 50,000				$ 300,000		$ 12,000	$ 312,000	$ 362,000
20					$ 50,000	$ 10,000		$ 60,000				$ 300,000		$ 12,000	$ 312,000	$ 372,000
21					$ 50,000			$ 50,000				$ 300,000		$ 12,000	$ 312,000	$ 362,000
22					$ 50,000			$ 50,000				$ 300,000		$ 12,000	$ 312,000	$ 362,000
23					$ 50,000			$ 50,000				$ 300,000		$ 12,000	$ 312,000	$ 362,000
24					$ 50,000			$ 50,000				$ 300,000		$ 117,000	$ 417,000	$ 467,000
25					$ 50,000	$ 10,000		$ 60,000				$ 300,000		$ 117,000	$ 417,000	$ 477,000
26					$ 50,000			$ 50,000				$ 300,000		$ 117,000	$ 417,000	$ 467,000
27					$ 50,000			$ 50,000				$ 300,000		$ 117,000	$ 417,000	$ 467,000
28					$ 50,000			$ 50,000				$ 300,000		$ 82,000	$ 382,000	$ 432,000
29					$ 50,000			$ 50,000				$ 300,000		$ 82,000	$ 382,000	$ 432,000
30					$ 50,000			$ 50,000				$ 300,000		$ 82,000	$ 382,000	$ 432,000

LANDSBURG DAM MITIGATION AGREEMENT COSTS — ALL SPECIES (Continued)

	STEELHEAD, COHO, AND CHINOOK MITIGATION*, RESEARCH AND MONITORING								SOCKEYE MITIGATION, RESEARCH, AND MONITORING								
HCP Year	Interim Mitigation	Diversion & Pipeline Ladders	Downstream Fish Passage	Intake Screens	Passage O&M**	Passage Monitoring***	Screen Monitoring****	Total Mitigation + Res. & Mon.	Interim Mitigation	Hatchery Construction	Brood Collection R & D	Hatchery O&M	Habitat Restoration	Monitoring Phase 1&2	Total Mitigation + Res. & Mon.	ALL SPECIES GRAND TOTAL MITIGATION &
31					$ 50,000			$ 50,000				$ 300,000		$ 82,000	$ 382,000	$ 432,000
32					$ 50,000			$ 50,000				$ 300,000		$ 12,000	$ 312,000	$ 362,000
33					$ 50,000			$ 50,000				$ 300,000		$ 12,000	$ 312,000	$ 362,000
34					$ 50,000			$ 50,000				$ 300,000		$ 12,000	$ 312,000	$ 362,000
35					$ 50,000			$ 50,000				$ 300,000		$ 12,000	$ 312,000	$ 362,000
36					$ 50,000			$ 50,000				$ 300,000		$ 12,000	$ 312,000	$ 362,000
37					$ 50,000			$ 50,000				$ 300,000		$ 12,000	$ 312,000	$ 362,000
38					$ 50,000			$ 50,000				$ 300,000		$ 12,000	$ 312,000	$ 362,000
39					$ 50,000			$ 50,000				$ 300,000		$ 12,000	$ 312,000	$ 362,000
40					$ 50,000			$ 50,000				$ 300,000		$ 12,000	$ 312,000	$ 362,000
41					$ 50,000			$ 50,000				$ 300,000		$ 12,000	$ 312,000	$ 362,000
42					$ 50,000			$ 50,000				$ 300,000		$ 117,000	$ 417,000	$ 467,000
43					$ 50,000			$ 50,000				$ 300,000		$ 117,000	$ 417,000	$ 467,000
44					$ 50,000			$ 50,000				$ 300,000		$ 117,000	$ 417,000	$ 467,000
45					$ 50,000			$ 50,000				$ 300,000		$ 117,000	$ 417,000	$ 467,000
46					$ 50,000			$ 50,000				$ 300,000		$ 82,000	$ 382,000	$ 432,000
47					$ 50,000			$ 50,000				$ 300,000		$ 82,000	$ 382,000	$ 432,000
48					$ 50,000			$ 50,000				$ 300,000		$ 82,000	$ 382,000	$ 432,000
49					$ 50,000			$ 50,000				$ 300,000		$ 82,000	$ 382,000	$ 432,000
50					$ 50,000			$ 50,000				$ 300,000		$ 12,000	$ 312,000	$ 362,000
TOTALS	$ 720,000	$ 2,011,000	$ 958,000	$ 2,859,000	$ 2,350,000	$ 170,000	$ 15,000	$ 9,083,000	$ 1,024,000	$ 7,710,000		$ 13,800,000	$ 1,637,000	$ 3,473,000	$ 27,844,000	$ 36,927,000

* Additionally, a special Design Contingency Fund of $583,000 will be available for construction of passage facilities if needed.

** Funding commences when fish passage facilities become operational.

*** Total shown includes both fish passage and water quality monitoring. Fish passage monitoring commences when fish passage facilities become operational. Water quality monitoring occurs up to 6 years ($10000 per year) with one measurement prior to fish passage facility construction and at HCP Years 8, 10, 15, 20, and 25.

**** Funding commences when fish screening facilities are completed.

Seattle Public Utilities
Cedar River Sockeye Hatchery Program
2014 Strategic Plan

Final: September 22, 2014

Seattle Public Utilities

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Sockeye Eggs

For More Information Contact:

Paul Faulds

Landsburg Mitigation Manager
Seattle Public Utilities
PO Box 34018
Seattle, WA 98124-4018
Office: 206-615-0021

Thank you to Betsy Daniels and Evan Lewis of Seattle-based Triangle Associates, Inc. for their process design, facilitation and documentation in support of the development of this strategic plan.

Introduction and Background

Purpose of the Cedar River Sockeye Hatchery Program Strategic Plan

Seattle Public Utilities (SPU) Hatchery Program is intended to mitigate for habitat lost to spawning sockeye above the Landsburg Dam and to augment natural spawning on the Cedar River within the framework of the hatchery Adaptive Management Plan (AMP). The Hatchery Program is required to have a capacity to produce up to 34 million fry annually, with the goal of a greater and more consistent number of returning adult sockeye annually to the Cedar River than would result without it. This Hatchery Program is expected to provide and contribute to the potential for more frequent and more robust sport and tribal harvest opportunities of Lake Washington sockeye salmon.

The purpose of this strategic plan is to establish a common understanding and agreement among the Adaptive Management Workgroup (AMWG) members, Landsburg Mitigation Agreement (LMA) party representatives and SPU leadership regarding the 2025 measurable goals for the Hatchery Program and the plans to achieve those goals. This strategic plan guides and informs operations, monitoring, and potential capital improvement projects that are necessary to meet commitments in the LMA. The AMWG will review this plan at annual and five-year intervals to determine if the actions identified have resulted in the expected measurable outcomes outlined as near-term milestones and longer-term goals.

The goals, milestones, and actions identified in this plan are under the purview of SPU and/or the Hatchery Program. SPU acknowledges there are many factors that might affect the success of the hatchery, including, but not limited to, the productivity of the Cedar River sockeye populations as a whole, marine survival, habitat, low flow conditions/flood events, and harvest management. This plan was prepared through a series of collaborative workshops undertaken by the AMWG. The full process by which this plan was developed is outlined in Appendix 1.

Background and Recent History of the Hatchery Program

The Cedar River Hatchery, located near the Landsburg Dam on the Cedar River, started operating in 2011 following twenty years of operation of an "interim" sockeye hatchery. This state-of-the-art facility was designed to hold over 4,000 adult sockeye for broodstock and to produce up to 34 million sockeye fry. SPU and the Washington Department of Fish and Wildlife (WDFW) have a cooperative agreement to operate the hatchery and remove constraints to the stated goals of the Hatchery Program.[1]

Hatchery Incubators and Ponds

In 2006, the AMP was written to define an operating and management framework for the Hatchery Program as a legal component of the LMA. The AMWG and the Technical Work Group (TWG) are specified in the AMP as the body of stakeholders responsible for overseeing research and monitoring under the plan on behalf of the Cedar River Hatchery.

The AMWG is composed of agency representatives and stakeholders, including the public at-large, with an interest in the Hatchery Program. It formulates recommendations to the Landsburg Mitigation Parties regarding operation of the hatchery. The TWG is composed of technical experts with a scientific focus on different aspects of salmon ecology, biology, and hatchery production science. The AMP provides direction for exploring and resolving "key scientific uncertainties" related to the effects of operating the hatchery. The AMP is intended to be critically reviewed and updated to reflect any significant developments or needed changes as the Hatchery Program evolves.

1 The Hatchery Program includes monitoring and evaluation activities under the AMP and the operation and maintenance of the hatchery facilities (i.e., broodstock collection, incubation, and adult holding facilities).

The following two biological goals were established for the Hatchery Program in the 2006 AMP for the hatchery:

Hatchery Facilities

- Implement the Cedar River Habitat Conservation Plan (HCP) and LMA commitments related to a biologically and environmentally sound long-term sockeye Hatchery Program that will help to provide for the recovery and persistence of a well-adapted, genetically diverse, healthy, harvestable population of Cedar River sockeye.

- Avoid or reduce detrimental effects on the reproductive fitness and genetic diversity of naturally reproducing salmon populations in the Cedar River and the Lake Washington Basin.

The Hatchery Program was developed with input from a broad array of technical experts from state, federal, and tribal fisheries management agencies, the academic community, and the public. The entire Hatchery Program, including the 2006 AMP, was formally approved by Washington Department of Fish and Wildlife (WDFW), NOAA Fisheries, the U.S. Fish and Wildlife Service, the Muckleshoot Indian Tribe, and Seattle Public Utilities.

Role of the Strategic Plan in SPU Hatchery Program Operation

There are three Hatchery Program management areas that this strategic plan intends to help guide:

1: AMP Interventions - The AMP provides "interventions" to respond to adverse scenarios within five key uncertainties. The five key uncertainties include:

1) Are hatchery and naturally produced fry similar in size, growth, and migration timing, and at a stable population composition?
2) Does the hatchery reduce the reproductive success of Cedar River sockeye salmon?
3) Will the hatchery adversely affect sockeye populations outside the Cedar River?
4) Will the hatchery produce adverse changes in Chinook salmon populations?
5) Will increased hatchery production alter aquatic community structure within the Lake Washington system?

This strategic plan outlines actions and defines roles for managing the hatchery to achieve its mitigation goals while these uncertainties are addressed.

2: AMWG Vision/Goals - The vision statement in the AMWG charter includes references to the following:

- "…well-adapted, genetically diverse, healthy, harvestable populations of Cedar River sockeye."
- "Avoid or reduce detrimental effects on the fitness and diversity…"
- "Produce a larger more consistent number of adult sockeye… such that more frequent and more robust tribal sport fisheries should result."

The strategic plan provides guidance on what measureable success looks like for these goals.

3: Examples of other policy decisions/management implications not addressed by the AMP-

- If a co-manager, or another party wants to try out a new strategy at the hatchery, who decides whether it should be implemented?
- How will the hatchery operate when it is at full capacity, specifically considering operational costs? Is operating at full capacity the goal? Who decides if this is a goal?
- Should the AMP guideline that limits the proportion of hatchery produced sockeye in the Cedar River be revisited, if, over time, the natural population of sockeye in the river are significantly impacted by other factors? These include, but are not limited to: climate change (i.e., increase in scour flows), invasive species effects, and indirect impacts from urban development.

The strategic plan provides guidance on resolving issues that are not addressed by the AMP.

Entities with a Stake in this Strategic Plan

Role and Composition of LMA Parties

The legal oversight of all management activities related to the Cedar River Hatchery is provided by the LMA Parties according to the terms of the LMA and also by the Muckleshoot Indian Tribe Settlement Agreement. The LMA Parties referred to here, and for the purposes of the AMP and the AMWG include: City of Seattle, U.S. Fish and Wildlife Service, NOAA Fisheries Service, WDFW, and the Muckleshoot Indian Tribe, by the powers provided in the MIT Settlement Agreement.

Role of SPU

SPU has overall responsibility and authority for managing all activities under the Hatchery Program which includes operating and maintaining the Cedar River Hatchery and implementing monitoring and evaluation studies under the hatchery AMP. SPU is committed to using adaptive management to address critical operational questions and make changes to operations based on the results of monitoring to meet specific Hatchery Program objectives. SPU receives Hatchery Program guidance and recommendations for actions from advisory bodies (AMWG & TWG) and the Parties to the LMA.

Role of the AMWG

The primary role of the AMWG is to direct the collection of information and to oversee and guide SPU's use of that information in its management of the Hatchery Program. AMWG advises SPU in two primary ways in order to best achieve the objectives of the AMP. First, it advises SPU in making ongoing recommendations to the LMA Parties about hatchery production and conservation strategies. Second, it advises SPU regarding important hatchery operational activities, including but not limited to:

- Setting egg-take goals;
- Establishing annual production plans;
- Broodstock collection;
- Spawning and incubation of eggs;
- Rearing, feeding, and marking of hatchery fry;
- Release of hatchery fry into the natural environment; and
- Monitoring, evaluating, and documenting hatchery activities.

AMWG objectives include:

- Using research, monitoring, and analysis to improve the effectiveness of hatchery operations;
- Providing input by tribal government, relevant agencies, AMWG, TWG, and LMA Parties in the operation of the hatchery; and
- Supporting the sharing of information about the Hatchery Program with interested stakeholder groups, such as sport fishing enthusiasts.

The AMWG is composed of agency representatives and stakeholders, including the public, with an interest in the Hatchery Program. The AMWG formulates recommendations regarding hatchery operations.

Current AMWG Membership:

Seattle Public Utilities (Chair)	Paul Faulds
U.S. Fish and Wildlife Service	Tim Romanski
NOAA Fisheries Service	Randy McIntosh
Washington Department of Fish and Wildlife	Aaron Bosworth
Muckleshoot Indian Tribe	Dennis Moore
King County DNR	Hans Berge
At-large Public Interest Stakeholder	Wild Fish Conservancy
At-large Public Interest Stakeholder	Puget Sound Anglers
At-large Public Interest Stakeholder	Frank Urabeck
At-large Public Interest Stakeholder	Bill Robinson

Appendix 2 provides an overview of the relationship between SPU and the AMWG and how decisions about the hatchery and the implementation of the strategic plan will take place over time.

Contents and Layout of the Strategic Plan

This strategic plan documents what will be happening in the year 2025 if the Hatchery Program is successful. Four key outcomes will be used to track the success of the Hatchery Program in meeting its 2025 goals. By 2025:

1. The Hatchery Program is meeting the long-term sockeye mitigation obligations in the LMA.
2. The Hatchery Program is meeting the objectives of the AMP.
3. Interactions among the LMA Parties, AMWG, TWG and SPU are productive and contributing to the success of the Hatchery Program.
4. Interested parties have increased understanding of the Hatchery Program.

Each key outcome includes one or more goals for 2025. Milestones that would need to be achieved on the path to meeting longer-term, 2025 goals are also included. Collectively, meeting the goals identified for each outcome is necessary for the Hatchery Program to be successful. This plan also includes actions that will be implemented in order to achieve the near-term milestones identified for each goal. Each year, SPU will work with the AMWG to identify a new set of actions (if needed) that are expected to achieve the next set of milestones. This process is outlined below.

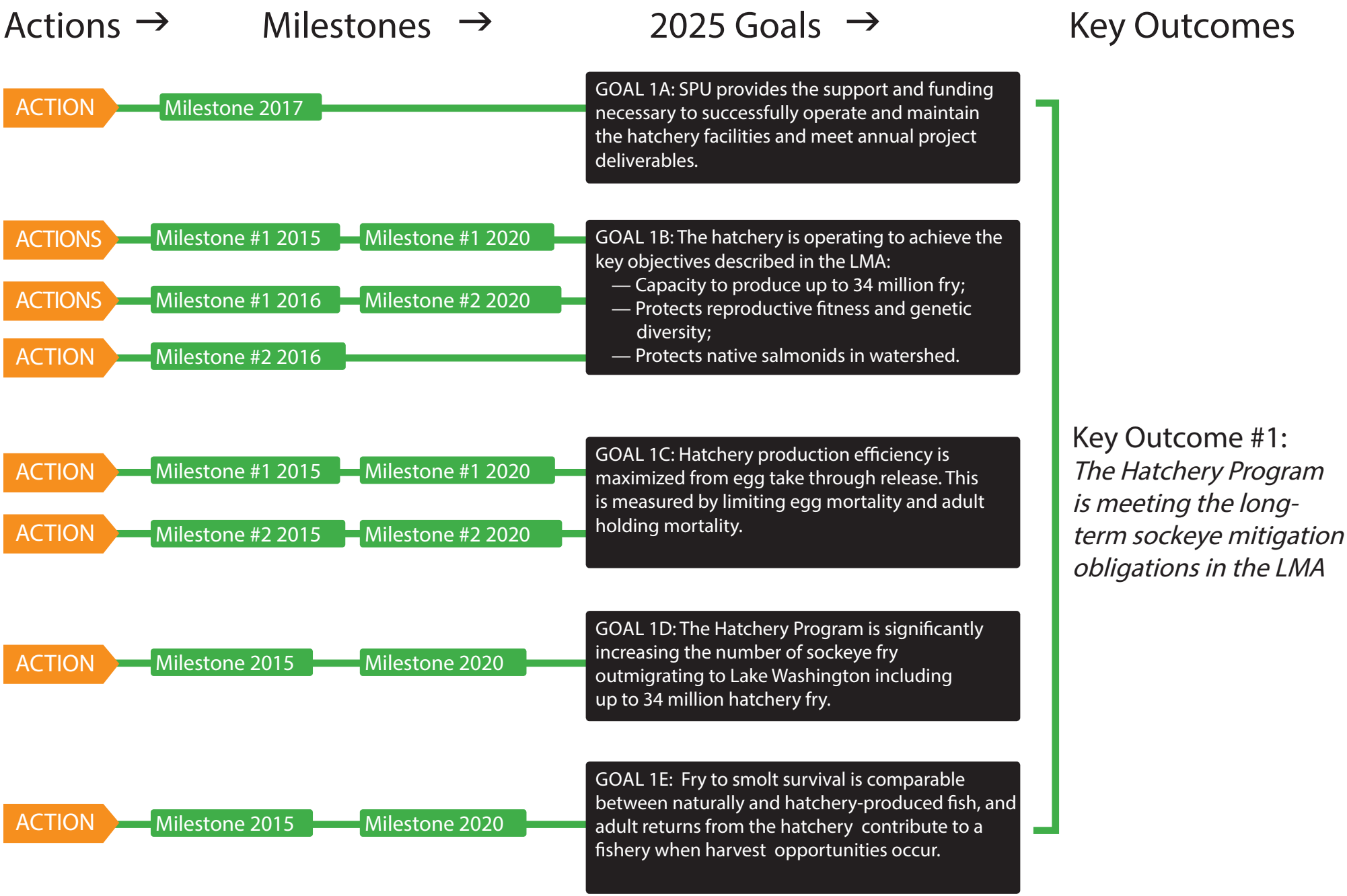
Actions →Near-Term Milestones →Actions →Longer-Term Milestones →Longer-Term Goals →Key Outcomes for the Hatchery Program's Success

Actions will be reviewed annually to determine if they have been completed and if they have resulted in the expected milestones, goals, and/or outcomes. Each year, SPU and AMWG will review the actions completed and milestones achieved using the following set of questions:

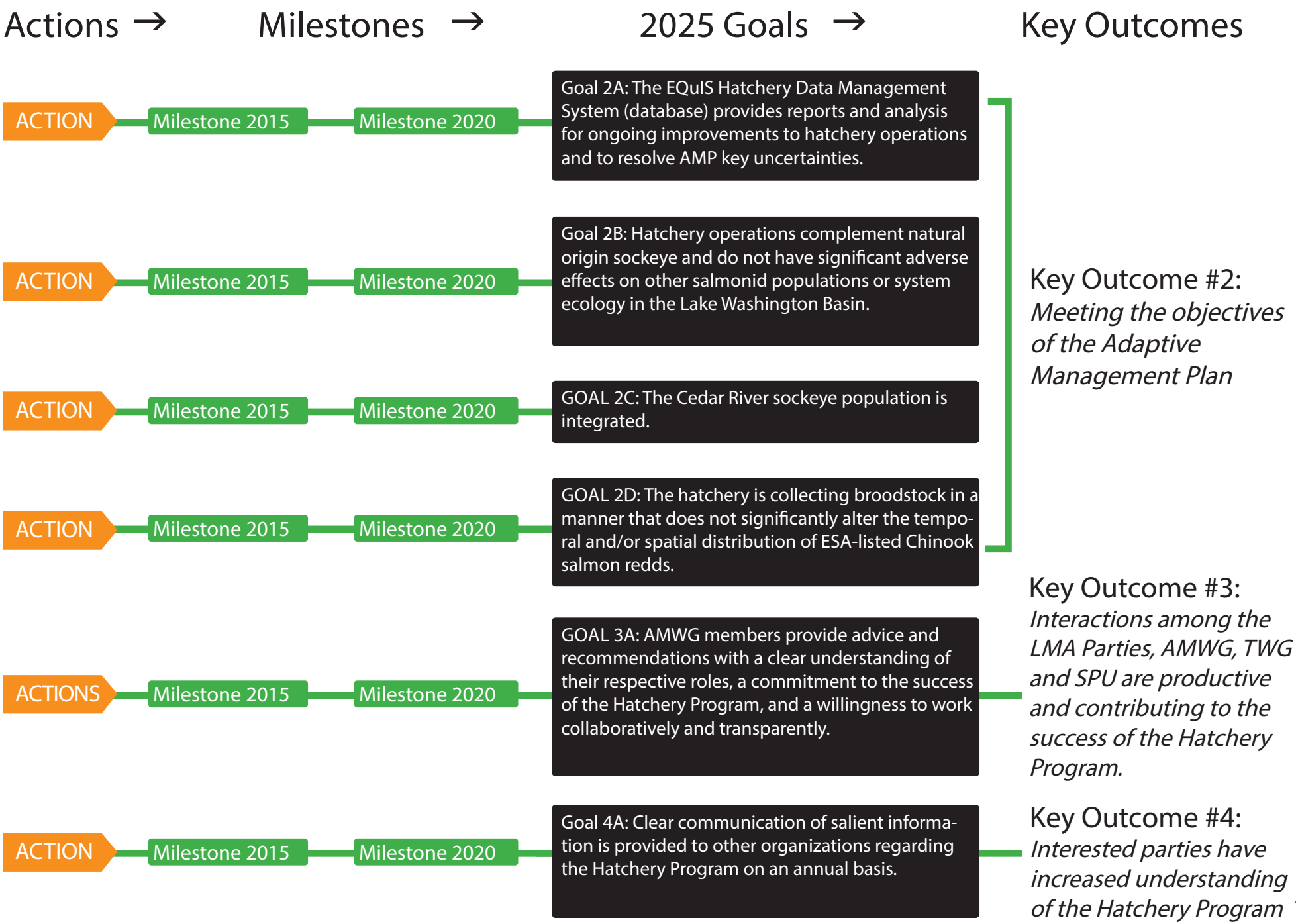
Has the action been completed?

<table>
<tr><th colspan="2">Yes</th><th>No</th></tr>
<tr><td colspan="2">Has completion of this action put the Hatchery Program on track to achieve the expected strategic plan milestones?</td><td rowspan="2">What needs to happen to complete this action?
• Rewrite the action? If so, consider S.M.A.R.T criteria (specific, measurable, achievable, relevant, time-bound).
• Rewrite the milestone?
• Make "on the ground" changes by improving or amending implementation activities?
• Something else?</td></tr>
<tr><th>Yes</th><th>No</th></tr>
<tr><td>Action marked as "completed"!</td><td>• Rewrite the action? If so, consider S.M.A.R.T criteria (specific, measurable, achievable, relevant, time-bound).
• Rewrite the milestone?
• Make "on the ground" changes.
• Something else?</td></tr>
</table>

Strategic Plan Structure



Strategic Plan Structure



Strategic Plan: Overview of Outcomes and Goals

In 2025, if the Hatchery Program is successful:

Key Outcome 1: The Hatchery Program is meeting the long-term sockeye mitigation obligations in the LMA.

To achieve this outcome, the following goals have been identified:

1A) SPU provides the support and funding necessary to successfully operate and maintain the hatchery facilities and meet annual project deliverables.

1B) The hatchery is operating to achieve the key objectives described in the LMA:

- Capacity to produce up to 34 million fry;
- Protects reproductive fitness and genetic diversity; and
- Protects native salmonids in watershed.

1C) Hatchery production efficiency is maximized from egg take through release. This is measured by limiting egg mortality and adult holding mortality.

1D) The Hatchery Program is significantly increasing the number of sockeye fry outmigrating to Lake Washington including up to 34 million hatchery fry.

1E) Fry to smolt survival is comparable between naturally and hatchery-produced fish, and adult returns from the hatchery contribute to a fishery when harvest opportunities occur.

Key Outcome 2: The Hatchery Program is meeting the objectives of the AMP.

To achieve this outcome, the following goals have been identified:

2A) The database provides reports and analysis for ongoing improvements to hatchery operations and to resolve AMP key uncertainties.

2B) Hatchery operations complement natural origin sockeye and do not have significant adverse effects on other salmonid populations or system ecology in the Lake Washington Basin.

2C) The Cedar River sockeye population is integrated.

2D) The hatchery is collecting broodstock in a manner that does not significantly alter the temporal and/or spatial distribution of ESA-listed Chinook salmon redds.

Key Outcome 3: Interactions among the LMA Parties, AMWG, TWG and SPU are productive and contribute to the success of the Hatchery Program.

To achieve this outcome, the following goal has been identified:

3A) AMWG members provide advice and recommendations with a clear understanding of their respective roles, a commitment to the success of the Hatchery Program, and a willingness to work collaboratively and transparently.

Key Outcome 4: The Hatchery Program is managing for external influences.

To achieve this outcome, the following goal has been identified:

4A) Clear communication of salient information is provided to other organizations regarding the Hatchery Program on an annual basis.

Key Outcome #1:

The Hatchery Program is meeting the long-term sockeye mitigation obligations in the LMA

Outcome Purpose: Fully implement long-term mitigation measures for sockeye salmon, monitoring, and adaptive management as described in the LMA. The Hatchery Program will have the capacity to produce up to 34 million fry annually and is expected to result in a greater and more consistent number of returning adult sockeye than would result without it. These fish will help provide more regular sport and tribal harvest opportunities in Lake Washington.

ACTIONS to achieve 2017 Milestone

In 2016 SPU and WDFW will designate staff to negotiate a new 5-year contract to operate the Cedar River Hatchery and the broodstock collection facility. In 2016, those staff will prepare a contract development schedule. SPU and WDFW will provide the AMWG with high-level quarterly updates on the contract negotiations as they progress. The updates will focus on schedule, scope of work, budget, and contract deliverables.

2017 Milestone

SPU and WDFW complete negotiations on the 5-Year Memorandum of Agreement (MOA) for hatchery operations with an effective date of July 1, 2017. This process will be repeated in 2022.

2025

GOAL 1A: SPU provides the support and funding necessary to successfully operate and maintain the hatchery facilities and meet annual project deliverables.

ROLE OF OTHER GROUPS

AMWG: Each quarter in 2016, and in the first half of 2017, the AMWG will be given an opportunity to provide the AMWG Chair with input regarding hatchery contract negotiations related to the scope of work, schedule, budget, and deliverables. The planned agreement will have direct specifications for hatchery operation and maintenance. As such, the AMWG will be expected to recommend contract approval to the LMA Parties once completed.

TWG: Briefed by AMWG Chair as necessary and beneficial for Hatchery Program support.

LMA Parties: Review and recommend execution of the contract by SPU and WDFW.

Sockeye Fry

Key Outcome #1 (continued):

The Hatchery Program is meeting the long-term sockeye mitigation obligations in the LMA

ACTIONS to achieve 2015 Milestone #1

1. SPU will complete Phase 1 (Project Initiation) for a potential capital project to improve broodstock collection by 8/31/14.[1]
2. Complete Phase 2 (Options Analysis) for a potential capital project by the end of 2014.[2]

ACTIONS to achieve 2016 Milestone #1

1. Phase 1 (Project Initiation) for a potential capital project to evaluate spring water supply sufficiency and reliability which was approved by the required SPU executive committee in March 2013.
2. SPU completes Phase 2 (Options Analysis) for a potential capital project by year-end 2015.[3]

ACTION to achieve 2016 Milestone #2

Identify proposed levels of service and associated performance measures (1st Qtr); Identify criticality levels for all facility assets (1st Qtr) and; develop maintenance/ replacement strategies for them with detailed documentation to support and guide those activities (2nd Qtr).

2015 Milestone #1

Broodstock Collection: An approved operational improvement or capital project alternative to ensure capacity for collecting broodstock to meet LMA legal requirements has been identified.

2016

Milestone #1

Spring Water Supply: A proposed operational improvement or capital project alternative to ensure sufficient IHN-virus free production water supply to meet LMA legal requirements has been identified.

Milestone #2

Hatchery Facilities Mgmt: Develop a detailed inventory of all facility system components and the equipment comprising them (1st Qtr).

2020 Milestone #1

Water is secured for incubation and release of 34 million fry.

Milestone #2

A technical and/or operational strategy is in place (technical, operational, and/or potential capital project) to minimize adult pre-spawn mortality (e.g. adequate broodstock holding, space and water) to meet 34 million fry. Functional weir is in place to achieve 34 million fry release.

2025 GOAL 1B: The hatchery is operating to achieve the key objectives described in the LMA:[4]

- Capacity to produce up to 34 million fry;
- Protects reproductive fitness and genetic diversity;
- Protects native salmonids in watershed.

ROLES OF OTHER GROUPS *(combined for Actions 1 and 2):*

AMWG: Subject matter experts on the AMWG may be consulted by SPU in Phase 2 (Options Analysis). The AMWG will receive a briefing from SPU near the conclusion of Phase 2. SPU will seek a recommendation from the AMWG to the LMA Parties for any proposed capital project.
TWG: Briefed by AMWG Chair as needed for Hatchery Program support.
LMA Parties: The LMA Parties will be asked to provide SPU with a recommendation regarding any proposed capital project.

from previous page, Goal 1B footnotes:

1 Phase 1 describes the rationale, recommendation, and project management plan (including staffing, schedule, and cost estimate) for proceeding to the next phase. This documentation is the basis of governance approval for proceeding to Phase 2, Options Analysis.

2 The Options Analysis will evaluate the technical merits of multiple alternatives and compare the benefits and costs of each viable alternative to select a preferred alternative. An SPU asset management committee must then approve the preferred alternative for it to move forward to Phase 3, design and permitting.

3 The business case will seek an alternative that: (1) reliably provides the hatchery's full design requirement of at least 1400 gpm of IHN virus-free water to the hatchery under all weather and hatchery production conditions; and (2) provides at least 500 gpm of redundant water supply. Options analysis will include but not be limited to: improving performance of the current delivery system, capturing additional spring water, incorporating a new pump station at the spring water pond (old hatchery site), protecting pump stations from falling trees, and a groundwater study for a potential new groundwater supply source.

4 From Section E.3.a. of the LMA: "The replacement sockeye Hatchery should 1) be designed to produce up to 34 million fry, 2) produce fry that are equivalent in quality to those that are produced naturally. The Hatchery Program should avoid or minimize detrimental impacts on the reproductive fitness and genetic diversity of naturally reproducing sockeye salmon populations in the Cedar River and Bear Creek subbasins and avoid or minimize detrimental ecological impacts on native salmonids throughout the watershed."

Key Outcome #1 (continued): The Hatchery Program is meeting the long-term sockeye mitigation obligations in the LMA

ACTION to achieve 2015 Milestone #1

By year-end 2014, SPU provides ongoing resources (consultant(s), SPU staff, TWG consultation, funding, and project management) to develop benchmarks for acceptable mortality and pathogen presence.

ACTION to achieve 2015 Milestone #2

SPU provides resources (consultant(s) SPU staff, TWG consultation, funding, and project management) to develop, adopt, and begin implementation of a disease and mortality study plan by the mid-year 2015.

2015 Milestone #1

Benchmarks for the ranges of acceptable adult pre-spawn mortality, acceptable egg mortality, and acceptable pathogen presence at the hatchery have been established.

2015 Milestone #2

A study plan for evaluating disease and mortality issues in excess of the established benchmarks has been recommended by TWG and AMWG, and adopted by SPU and WDFW hatchery management.

2020 Milestone #1

Benchmarks for the ranges of acceptable adult pre-spawn mortality, acceptable egg mortality, and acceptable pathogen presence have been evaluated and confirmed or altered based on data from the hatchery.

2020 Milestone #2

Any studies aimed at evaluating mortality or disease issues before 2017 have been implemented and data have been evaluated.

2025 GOAL 1C: Hatchery production efficiency is maximized from egg take through release. This is measured by limiting egg mortality and adult holding mortality.

ROLE OF OTHER GROUPS *for Action to achieve 2015 milestone #1:*

AMWG: Consults with SPU in the development and adoption of benchmarks for acceptable levels of adult pre-spawn mortality, egg mortality, and pathogen presence.

TWG: Provides technical support to develop benchmarks for acceptable levels of adult pre-spawn mortality, egg mortality, and pathogen presence.

LMA Parties: Briefed by AMWG Chair as needed for Hatchery Program support.

ROLE OF OTHER GROUPS *for Action to achieve 2015 milestone #2:*

AMWG: Reviews and comments on study plan.

TWG: Provides technical input and/or primary project management in the development of a study plan for evaluating adult pre-spawn mortality.

LMA Parties: Briefed by AMWG Chair as necessary and beneficial for Hatchery Program support.

Key Outcome #1 (continued):

The Hatchery Program is meeting the long-term sockeye mitigation obligations in the LMA

ACTION to achieve 2015 Milestone

SPU provides resources (consultant, SPU staff, TWG consultation, funding, and project management) for fry outmigration studies in 2015.

2015 Milestone

SPU funds collection of fry outmigration data so that the relative and total hatchery fry contributions can be measured.

2020 Milestone

Fry outmigration monitoring occurs and contributions of hatchery fry are recorded (annually).

2025 GOAL 1D: The Hatchery Program is significantly increasing the number of sockeye fry outmigrating to Lake Washington including up to 34 million hatchery fry.

ROLE OF OTHER GROUPS

AMWG: Provides the LMA Parties with a recommendation regarding the 2015 milestone.

TWG: Briefed by AMWG Chair as needed for Hatchery Program support.

LMA Parties: In 2015, LMA Parties will provide SPU with a recommendation regarding the 2015 milestone.

ACTION to achieve 2015 Milestone

Monitor freshwater survival of juveniles as noted in Key Outcome 2, meeting the objectives of the AMP.

2015 Milestone

Same as 2025 goal.

2020 Milestone

Same as 2025 goal.

2025 GOAL 1E: Fry to smolt survival is comparable between naturally and hatchery-produced fish, and adult returns from the hatchery contribute to a fishery when harvest opportunities occur.[1,2]

ROLE OF OTHER GROUPS

AMWG: Provide the LMA Parties with a recommendation to best achieve the 2025 goal.

TWG: Evaluate monitoring information and provide AMWG and SPU with a recommendation to best achieve the 2025 goal.

LMA Parties: Review recommendations from AMWG and TWG and provide SPU with a recommendation to best achieve the 2025 goal.

1 Any monitoring associated with harvest management is the responsibility of co-managers and not SPU.

2 Harvest opportunities include non-tribal sport and/or tribal fisheries.

Key Outcome #2:

The Hatchery Program is meeting the objectives of the Adaptive Management Plan

Outcome Purpose: Address scientific uncertainty to ensure that unwanted environmental consequences of the Hatchery Program are minimized or avoided.

ACTION to achieve 2015 Milestone

SPU implements development of the database. In 2015, SPU will provide resources for completing development and for product testing, user training, and ongoing data system stewardship.

2015 Milestone

Sockeye database development is complete and provides ongoing data stewardship.

2020 Milestone

Same as 2025 goal.

2025 GOAL 2A: The database provides reports and analysis for ongoing improvements to hatchery operations and to resolve AMP key uncertainties.

ROLE OF OTHER GROUPS

AMWG: Receives training on output functions and use of database reports in 2015.

TWG: Provides technical direction for requirements of database reporting and data request capacity development, and receives training on output functions in 2015.

LMA Parties: Briefed as necessary and beneficial to Hatchery Program support by AMWG Chair.

Weir

Key Outcome #2 (continued):

The Hatchery Program is meeting the objectives of the Adaptive Management Plan

ACTION to achieve 2015 Milestone

SPU provides resources (consultant, SPU staff, funding, and project management) for Monitoring and Evaluation (M&E) Plan development and implementation. M&E Plan will track metrics linked directly to thresholds and triggers in the AMP. The M&E Plan will be completed by the end of the second quarter of 2015 and will cover monitoring activities through 2025. However, it is a living document and can be updated as necessary.

2015 Milestone

An adopted M&E Plan for the AMP Key Uncertainties is implemented by the third quarter of 2015 to monitor and evaluate hatchery operations.

2020 Milestone

The monitoring strategy is implemented to achieve the 2025 goal.

2025 GOAL 2B: Hatchery operations complement natural origin sockeye and do not have significant adverse effects on other salmonid populations or system ecology in the Lake Washington Basin.

ROLE OF OTHER GROUPS

AMWG: Review and provide comments to SPU regarding proposed draft final M&E Plan. Comments will be considered by the TWG and SPU. AMWG will forward an M&E Plan recommendation to the LMA Parties.

TWG: Oversee the M&E Plan development and implementation in consultation with SPU technical staff. TWG will forward the recommended plan to AMWG for review, comment, and recommendation to the LMA Parties.

LMA Parties: Provide SPU with an M&E Plan recommendation.

Key Outcome #2 (continued):

The Hatchery Program is meeting the objectives of the Adaptive Management Plan

ACTION to achieve 2015 Milestone

SPU provides resources (consultant, SPU staff, funding, and project management) for M&E Plan development by mid-year 2015 and begins implementation. The M&E Plan will be used to track metrics linked directly to thresholds and triggers in the AMP.

2015 Milestone

The M&E Plan for the AMP Key Uncertainties is implemented by third quarter 2015 and will be used to monitor and evaluate hatchery operations.

2020 Milestone

The monitoring strategy is implemented to achieve the 2025 goal.

2025 GOAL 2C: The Cedar River sockeye population is integrated.[1, 2]

ROLE OF OTHER GROUPS

AMWG: Review and provide the AMWG Chair comments on final draft M&E Plan (early 2015). Comments will be considered by the TWG and SPU. AMWG will forward an M&E Plan recommendation to the LMA Parties.

TWG: Oversee the M&E Plan development and implementation. TWG will forward the recommended plan to AMWG.

LMA Parties: Provide SPU with an M&E Plan recommendation.

1 Hatchery and natural origin fish are undifferentiated. The natural environment drives the adaptation and fitness of composite population of fish that spawn both in the hatchery and in the wild. HSRG Technical Discussion Paper #1, June 21, 2004.

2 **Measure**: The hatchery has contributed to no more than 50 percent of the spawning population in the Cedar River, on a 10-year running average starting in 2015, or as reevaluated by SPU and AMWG.

Otolith

Key Outcome #2 (continued):

The Hatchery Program is meeting the objectives of the Adaptive Management Plan

ACTION to achieve 2015 Milestone

SPU provides resources (consultant, SPU staff, funding, and project management) for M&E Plan development by mid-year 2015 and begins implementation. The M&E Plan will be used to track metrics linked directly to thresholds and triggers in the AMP.

2015 Milestone

The M&E Plan for the AMP Key Uncertainties is implemented in the third quarter of 2015 and is used to monitor and evaluate hatchery operations.

2020 Milestone

Same goal as 2025.

2025

GOAL 2D: The hatchery is collecting broodstock in a manner that does not significantly alter the temporal and/or spatial distribution of ESA-listed Chinook salmon redds.[1]

ROLE OF OTHER GROUPS

AMWG: Review and provide the AMWG Chair comments on final draft M&E Plan. Comments will be considered by the TWG and SPU. AMWG will forward an M&E Plan recommendation to the LMA Parties.

TWG: Oversee the M&E Plan development and implementation. TWG will forward the recommended plan to AMWG.

LMA Parties: Provide SPU with an M&E Plan recommendation.

1 **Measure:** ESA-listed Chinook salmon are successfully migrating past and spawning above the broodstock collection

Key Outcome #3:

Interactions among the LMA Parties, AMWG, TWG and SPU are productive and contribute to the success of the Hatchery Program.

Outcome Purpose: To help SPU make decisions in order to meet the goals and objectives of the Hatchery Program as described in the LMA.

ACTIONS to achieve 2015 Milestone

1 SPU regularly provides advisory groups with the necessary information and direction to make credible recommendations to the LMA Parties and SPU on Hatchery Program issues.

2 The SPU Landsburg Mitigation Manager acts as liaison to both AMWG and TWG to facilitate collaborative and transparent relationship between work groups.

2015 Milestone

The TWG and AMWG relationship is clear.

2020 Milestone

Same goal as 2025.

2025

GOAL 3A: AMWG members provide advice and recommendations with a clear understanding of their respective roles, a commitment to the success of the Hatchery Program, and a willingness to work collaboratively and transparently. [1]

ROLE OF OTHER GROUPS

AMWG: Members will come to meetings fully prepared to discuss agenda items in a collaborative manner with the goal of reaching consensus on credible recommendations to SPU. AMWG will consult the TWG as the primary technical experts, as appropriate, when preparing policy and Hatchery Program recommendations.

TWG: Members will come to meetings fully prepared to discuss agenda items in a collaborative manner with the goal of reaching consensus on credible recommendations to AMWG and SPU. TWG Chair and members will make themselves available for discourse with AMWG regarding technical issues.

LMA Parties: Review recommendations by AMWG and, if acceptable, forward recommendations to SPU for implementation.

1 **Measure**: AMWG members reach consensus more often than they disagree.

Key Outcome #4:

Interested parties have increased understanding of the Hatchery Program

Outcome Purpose: Information associated with the Hatchery Program is actively shared with the public and external organizations whose actions have the potential to impact sockeye survival in Lake Washington.

ACTION to achieve 2015 Milestone

By the end of 2015, SPU will develop a public outreach/communication plan that will provide the public and other relevant organizations with accurate, factual, and accessible information about the Hatchery Program.

2015 Milestone

The communications plan is implemented to provide information to other relevant organizations in the Lake Washington Basin regarding the Hatchery Program.

2020 Milestone

Same goal as 2025.

2025 Goal 4A: Clear communication of salient information is provided to other organizations regarding the Hatchery Program on an annual basis.

ROLE OF OTHER GROUPS

AMWG: Review and comment on proposed public outreach/communication plan.

TWG: Briefed by AMWG Chair as needed for Hatchery Program support.

LMA Parties: Will be asked to provide input to SPU.

Sockeye Salmon

Appendix 1: Strategic Plan Development Process

Through a series of six strategic planning workshops from November 2013 to June 2014, AMWG members developed recommendations that answered the question "In 2025, if the Hatchery Program is successful how would we know it? What would be happening?"

This planning process involved a systematic approach where end goals and means to achieve those goals were clearly delineated. The following steps were followed to develop this strategic plan:

Step 1 (Key Outcomes): AMWG brainstormed and refined goal statements that are stated as clear measurable outcomes demonstrating what, in 2025, will make the Hatchery Program successful. Goals in common were grouped under "Key Outcomes," each with a purpose statement to explain why the goals are important to the success of the Hatchery Program.

Step 2 (Milestones): Working back from each 2025 goal, AMWG determined interim measureable outcomes, noted as "milestones," that would need to be in place in order to achieve the 2025 goal(s).

Step 3 (Review): The LMA party representatives reviewed and commented on the recommended long-term goals and near-term milestones.

Step 4 (Clarification of Decision-Making): Based on comments from the LMA parties, SPU clarified the role of SPU as the responsible party, and the roles of the LMA parties and AMWG in the implementation of the strategic plan.

Step 5 (Refine): AMWG updated and refined the goals and milestones of the strategic plan.

Step 6 (Identify Actions): AMWG identified actions that would need to be implemented to achieve the near-term milestones.

Step 7 (Package and review): SPU worked with a consultant and an iterative review process with the AMWG and LMA Parties to finalize the strategic plan content and format.

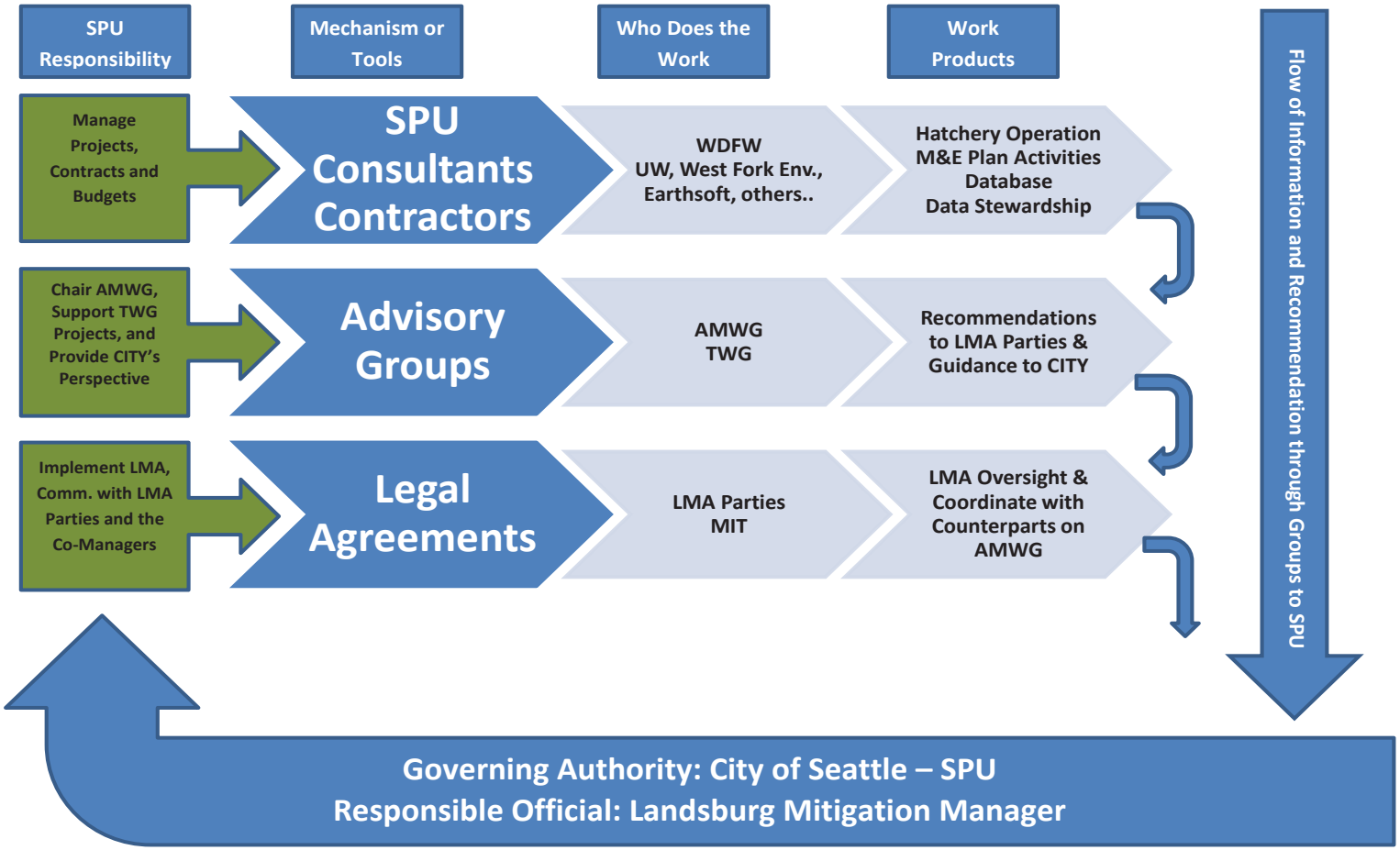
Step 8 (AMWG Recommends Plan Approval): AMWG recommends plan approval, and AMWG Chair provides plan to LMA Parties.

Step 9 (SPU and LMA Party Approval): LMA Parties approve plan and recommend SPU implementation of the plan.

Adult Sockeye Holding Ponds

Appendix 2: Hatchery Program Decision Making Structure[1]

Implementation Process for Sockeye Hatchery AMP



1 Refer to AMWG Charter, section 2bi.

Seattle Public Utilities

Adaptive Management Plan
Cedar River Sockeye Hatchery

February 2006

Tetra Tech/KCM, Inc.
1420 5th Avenue, Suite 600, Seattle, WA 98101

ADAPTIVE MANAGEMENT PLAN
CEDAR RIVER SOCKEYE HATCHERY

February 2006

Prepared for:
Seattle Public Utilities
710 Second Avenue
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Prepared by:

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Project #2190030

Adaptive Management Plan
Cedar River Sockeye Hatchery
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INTRODUCTION

1.1 EXECUTIVE SUMMARY

1.1.1 AMP Purpose and Objectives

This Adaptive Management Plan (AMP) defines an operating and management framework for the Cedar River Replacement Sockeye Hatchery Program. This program was developed to address dual objectives of realizing the full potential of the Cedar River to support sockeye while protecting drinking water quality. This AMP includes an initial technical basis for monitoring and evaluation of the Cedar River Replacement Sockeye Hatchery. The application of adaptive management to hatchery operations and evaluation is rare; consequently, this AMP relies primarily on the experience of other efforts adapted to the unique challenges of this program. Application of adaptive management to this hatchery program has the potential for achieving unusually high standards for monitoring, evaluation and decision-making.

The primary purpose of the AMP is to help the hatchery program meet its mitigation goals by minimizing risks of long-term adverse impacts through effective monitoring and management. There are two important biological goals for this hatchery program.

- Implement the Cedar HCP and Landsburg Mitigation Agreement commitments related to a biologically and environmentally sound long-term sockeye hatchery program that will help to provide for the recovery and persistence of a well-adapted, genetically diverse, healthy, harvestable population of Cedar River sockeye.
- Avoid or reduce detrimental effects on the reproductive fitness and genetic diversity of naturally reproducing salmon populations in the Cedar River and the Lake Washington basin.

The success of this hatchery program will rely on the ability to integrate artificial and natural production systems to realize the full biological potential of the physical environment. Consequently this AMP focuses on potential risks to naturally spawning salmon, prescribes monitoring activities to detect effects, and establishes a process for analyzing and addressing adverse impacts if they occur. This hatchery program will be deemed a failure if it results in a substantial loss of the ability for naturally reproducing sockeye or chinook to sustain themselves or if it fails to significantly increase sockeye returns to the Cedar River. The proposed hatchery is expected to augment natural spawning on the Cedar River and, if successful, will produce a greater and more consistent number of returning adult sockeye than would result without it. This is expected to increase sport and tribal harvest opportunities of the Lake Washington sockeye salmon fishery.

Within this context for the goals of the sockeye hatchery program, the objectives of this AMP are:

1. Address the primary technical uncertainties with respect to performance and effects of the replacement hatchery program
2. Promote a high standard for scientific work so that results are credible
3. Effectively communicate scientific results to managers
4. Provide public access to scientific data
5. Provide opportunity for public input to decision-making process
6. Promote public understanding of decisions
7. Utilize limited monitoring resources effectively and efficiently

Success of the AMP will be determined by the achievement of these objectives over time.

Scientists, hatchery operators and fishery managers, with expertise in hatchery operations and the effects of those operations on other resources, have guided the development of this hatchery program. Their work has resulted in guidelines, operating protocols, capacity analysis and this adaptive management plan that is designed to contribute to the success of the program by producing additional adult returns and by minimizing adverse effects. The adaptive management plan will not direct harvest management actions, for which the fishery co-managers have regulatory authority; however, the AMP will generate valuable information for harvest management.

1.1.2 Challenges of Adaptive Management

Adaptive management is a term whose definition in practice is imprecise. However, many adaptive management efforts include similar elements that include defining experiments to test responses of predetermined variables and applying the results to future management decisions. Adaptive management has been applied to projects and programs of various sizes. Generally, the more complex the program or range of potential variables that are affected by a specified action, the more difficult it is to determine causal relationships and to use monitoring results to make appropriate management responses. Thus, too much complexity makes it difficult to apply adaptive management. Nevertheless, establishing a monitoring program that provides relevant information, even if that information is not fully conclusive, still provides a better basis for professional judgment than no information at all. Therefore, the adaptive management decision-making process must respond to various inputs, ranging from recommendations based on statistically certain results to those based on expert judgment informed by the available information. Adaptive management is used to learn about ecosystems as well as to control risk of adverse effects of specific projects. By defining key uncertainties associated with impacts or results of the project, adaptive management encourages collection of appropriate data that are needed to evaluate the project. These results are reviewed by scientists, who provide technical advice to a decision-making body that ultimately determines if program changes should be made to reach its objectives.

Experience with adaptive management has resulted in mixed results. The concept has proved useful for providing a structure that allows people with differing perspectives to agree to allow controversial natural resource actions to proceed, while working together to develop a greater understanding of the results and effects. At the same time, and in many cases, adaptive management has been challenged to fully integrate scientific input into management decisions. Also, some believe that adaptive management has failed to force hard decisions by managers, in spite of scientific results that support these decisions.

A key goal of adaptive management is to encourage accountability and transparency in decision-making. Scientific data, analyses and recommendations are intended to form key input to management decisions through adaptive management. Consequently, the quality of scientific work needs to be sufficient to be generally accepted and not in itself a source of significant uncertainty. Peer review of proposals and reports, involvement by independent scientists, statistical evaluation of research proposals and timely access to data are important ways of improving the credibility of scientific results.

1.1.3 Development of This AMP

This AMP is a requirement of the Cedar River Habitat Conservation Plan and the Landsburg Mitigation Agreement (LMA) and is to be in place prior to beginning operations of the replacement hatchery. In early 2000 the City of Seattle assembled a special scientific advisory panel as called for in the LMA. This panel was established to advise the City of Seattle and the other Parties to the LMA in developing plans for an effective, comprehensive, and biologically sound artificial propagation program consistent with the Habitat Conservation Plan. The panel included experts in sockeye biology, Lake Washington ecology, fish diseases, genetics and recent hatchery reform initiatives. They came from University of Idaho, University of Washington, U.S. Fish and Wildlife Service, National Marine Fisheries Service and U.S. Geological Survey. The science panel developed guiding principles for the hatchery embodied in *The Cedar River Sockeye Salmon Hatchery Plan* (Brannon et al., 2001). Recommendations from this document have been used to develop further program documents, including the AMP. The science panel reviewed the status and factors affecting sockeye in the Cedar/Lake Washington basin and recommended monitoring and research needs. The AMP is responsive to these recommendations. The hatchery plan provides guidelines for improving survival of hatchery releases and minimizing adverse interactions between hatchery and wild fish.

The development of the proposed AMP for the sockeye hatchery involved research into past and current efforts to implement adaptive management by others. No examples of the detailed application of adaptive management to hatchery operations were found in the literature; however, there were examples of the use of adaptive management in other natural resource applications. In addition to information gathered from this literature review, the Cedar River Sockeye Hatchery AMP relies on information gathered from three adaptive management workshops, sponsored by Seattle Public Utilities (SPU) and Washington Trout in 2001, 2002 and 2004. Regional and national experts were brought together to discuss the challenges and lessons learned from previous efforts to develop and implement adaptive management programs. This exchange of ideas and experiences provided guidance concerning how the AMP decision-making process should be structured to achieve AMP objectives.

Tetra Tech/KCM Inc. was contracted to develop the proposed Adaptive Management Plan. This effort involved various technical experts in salmon biology, hatchery issues, genetics, and sockeye salmon culture. The AMP for the Cedar River Hatchery was further developed by a group of select scientists, led by Dr. Tom Quinn, U. of Washington. An earlier version was reviewed by the Cedar River Anadromous Fish Committee (AFC), the advisory committee comprised of scientists and stakeholders established in the LMA to provide advice and consultation to the City concerning the implementation of the LMA. AFC membership currently includes City of Seattle, WDFW, NOAA Fisheries, U.S. Fish and Wildlife Service, Muckleshoot Indian Tribe, Trout Unlimited, Puget Sound Anglers, Washington Trout, King County, Long Live the Kings and the public at-large. Comments from committee members were reviewed by the authors. These comments included questions regarding the level of certainty associated with the effects of domestication selection; assumptions about fry survival rates; how future production levels would be established; whether measurements of fry to adult survival were meaningful assessments of fitness; and the need to establish clear thresholds and responses.

More recently, SPU has sought comment from Dr. Barry Gold, a recognized national expert in adaptive management (Dr. Gold led the adaptive management program for the Glenn Canyon Dam project). The Hatchery Science Reform Group (HSRG) reviewed the Cedar River sockeye hatchery, including the earlier version of the proposed AMP. The HSRG was established by Congress in FY 2000 to ensure that hatchery reform programs in Puget Sound and Coastal Washington are scientifically founded and evaluated; that independent scientists interact with agency and tribal scientists to provide direction and operational guidelines; and that the system as a whole be evaluated for compliance with scientific recommendations (further information on members of the HSRG can be obtained at www.longlivethekings.org/HRP_HSRG.html).

The hatchery AMP will be used to help to respond to uncertainties identified in the HCP adaptive management plan, including potential edffects of the hatchery on naturally spawning Chinook and sockeye.

The AMP will be presented to the parties of the LMA for their acceptance after the State Environmental Policy Act (SEPA) process is concluded.

1.1.4 Key Features of this AMP

The Cedar River Hatchery Adaptive Management Plan includes a discussion of five key areas of uncertainty and describes the structural framework that guides scientific work as well as decision-making. The key uncertainties are as follows:

- Comparability between fry produced by the hatchery and in the river
- Effects on reproductive fitness in naturally spawning sockeye
- Effects on sockeye populations outside the Cedar River
- Effects on Cedar River chinook
- Effects on the aquatic community in Lake Washington.

The discussion of each of these uncertainties includes potential hypotheses, criteria, results and responses. The Plan is intended to be flexible and to be adjusted over time as necessary to reflect current knowledge or experience.

This plan includes an organizational framework (see Section 4) that is intended to promote credible scientific input and informed decision-making. The ultimate decision-making body is made up of representatives from the four Parties to the LMA: the City of Seattle, the U.S. Fish and Wildlife Service, National Oceanic and Atmospheric Administration (NOAA) Fisheries and the Washington Department of Fish and Wildlife. Under the LMA, the parties are committed to using adaptive management to address critical questions as they arise and make changes in management based on the results of monitoring to meet the specific objectives of the hatchery program. The parties receive advice directly from the Adaptive Management Work Group (AMWG) and will have access to recommendations from the scientist panels as well. The AMWG will include agency scientists and stakeholders. This group will be advised by the Independent Science Advisors (ISA), the Technical Work Group (TWG) and the Monitoring and Research Parties. Each group has a specific role as will be described below.

This structure is intended to allow the development of sound scientific direction that will help the decision-makers to manage the hatchery program. Considerable emphasis will be placed on measures needed to ensure that the appropriate monitoring data are collected in a scientifically and statistically sound manner so that results address key outstanding uncertainties. For example, the productivity of Cedar River sockeye and chinook will continue to be monitored to evaluate whether changes are occurring.

The fry production level for this hatchery is capped at 34 million fry, roughly double the hatchery capacity provided by the interim hatchery facility. The interim hatchery has operated since 1991 and the production levels have generally trended higher over its operations. The operation of the interim hatchery could have resulted in changes that are the subject of monitoring and evaluation under this adaptive management program. Thus, it will be important to consider baseline conditions as both pre-hatchery and interim hatchery, as appropriate, when considering reference conditions for the evaluation of impacts. In some cases, the availability of baseline information may limit comparisons with pre-hatchery or interim hatchery conditions.

The actual operating target level will be established annually by the parties to the LMA, based on factors including, but not limited to: 1) an assessment of the risk of irreversible harm; and 2) the goal, established in the Capacity Analysis, that over the long term and on average, hatchery returns will contribute no more than 50 percent of the overall sockeye return to the Cedar River. The assessment of risk will be a synthesis of monitoring results and analyses of the effects of the hatchery program in the key areas of uncertainty. Predefined thresholds will be established where possible, to aid in identifying levels where results would suggest that effects should be critically reviewed and action considered or implemented. Thus, setting the annual production goal for the hatchery is one of the primary outcomes of the adaptive management process. Results from adaptive management will also be used to improve returns as results from various culture strategies are learned and applied.

Key uncertainties reflect those issues that have special importance in terms of potential effects. One example is the special emphasis the hatchery program places on maintaining the reproductive fitness of naturally spawning sockeye in the Cedar River. Maintaining the productivity of natural spawning sockeye is critical to producing the larger salmon returns that are needed to hold more frequent fisheries, one measure of success. To do so means protecting the productivity of the sockeye population that spawns in the river over the long term. There are no studies that have examined the effects of a sockeye fry hatchery on reproductive fitness of a composite stock comprised of returns that have varying levels of hatchery and natural spawning influence. Consequently, the adaptive management program identifies the maintenance of reproductive fitness in Cedar River sockeye as a key uncertainty and directs monitoring to measure productivity of natural spawners over time. This program represents significant opportunity to study hatchery effects and contribute to a broader understanding of this issue.

To further reduce risk and to reinforce the fact that this program is intended to supplement, not detract from natural production of sockeye in the Cedar River, a unique goal of this hatchery is to adjust egg collection goals so that overtime and after an initial start up period, the return of naturally produced sockeye will be at least 50 percent of the total return. Thus, if natural productivity declines, hatchery production would decline as well. This quantitative goal is discussed in the Capacity Analysis section of the Program Documents and is intended to place heightened awareness on the need to maintain or improve the health of both naturally spawning sockeye and their habitat. This pioneering connection between hatchery and natural production is intended to help to avoid the replacement of naturally- produced sockeye with hatchery returns. Maintaining an upper limit of 50 percent hatchery origin in the return means that a significant portion of returns will have been subjected to the full range of selection pressures by spawning naturally. It also means that substantial numbers of sockeye used for broodstock in the hatchery will be of natural origin, which some believe will likely improve the fitness of the hatchery-origin sockeye as they return and spawn in the river. The proposed long-term maximum for hatchery-produced returns will be evaluated through monitoring and adaptive management and could be adjusted in the future.

1.1.5 AMP Implementation

Monitoring activity associated with the interim sockeye hatchery program, while not directed by the adaptive management plan, has been ongoing since the early 1990's. Results from this work are being used to guide the project through the oversight of the Cedar River Anadromous Fish Committee and the Parties to the Landsburg Mitigation Agreement. These data provide baseline information about the existing level of sockeye production and about the other salmonid populations and Lake Washington ecosystem. The AMP process will need to evaluate information that has been collected to date regarding effects of the interim hatchery as well as to establish future direction for the monitoring and evaluation elements as the replacement hatchery begins operation. There are known limitations associated with the interim hatchery that are being addressed in the design of the replacement hatchery. This adds complexity to the evaluation of the replacement hatchery, but also provides opportunity for insight into cause and effect relationships (e.g. size of returning females). The adaptive management process will need to consider whether changes have already occurred during the operation of the interim hatchery using all data that are available. Some of these analyses may be limited by the availability of data.

While the Cedar River Hatchery is not scheduled to be completed and operating until 2008, the AMP implementation schedule (see Section 4) calls for AMP activity to begin in 2006. The parties, with the advice of the Adaptive Management Work Group, will oversee the recruitment of the Technical Work Group as well as the development of a list of independent scientific advisors. Once the key groups are formed and operating parameters defined, a review of the AMP will occur in 2006. The primary purpose is to ensure that the people who will be involved with the implementation of the AMP have the opportunity for input. In particular, the TWG and the AMWG will be asked to evaluate the list of uncertainties, identify specific hypotheses for testing, review the monitoring program, and review and further develop criteria, thresholds and responses prior to implementation. Changes to this plan are expected at this point as those who will be working on this program apply their knowledge and expertise. Specificity in setting thresholds for specific criteria provides greater assurance of response when these are exceeded. Pre-determined responses will be identified and may be either changes to the hatchery program or initiation of a conscientious evaluation of the situation that may lead to an action as defined by the adaptive management process.

Much emphasis is being placed on the importance of reforming hatchery practices so that effects on natural populations are minimized. The adaptive management plan serves to address a common concern that many hatchery programs lack sufficient evaluation. Proper evaluation needs to document natural and hatchery contributions to adult returns as well as examine key areas where the hatchery program may be having adverse effects. The long-term commitment to monitoring associated with this hatchery is unusual and provides a basis of support for the AMP. Its implementation and success will rely on the cooperation of scientists, agencies and stakeholders to participate with objectivity and commitment to the goals of the program.

1.2 BACKGROUND

Adaptive management is an approach that incorporates monitoring and research to allow projects and activities, including projects designed to produce environmental benefits, to go forward in the face of some uncertainty regarding their consequences (Holling 1978; Walters 1986). In the adaptive management process, high priority is placed on learning about the subject ecosystem; in order to learn, management policies are designed as experiments to probe ecosystem responses (Lee 1999). Two essential characteristics of effective adaptive management are a direct feedback loop between science and management, and the view of management as an experiment (Halbert 1993).

The ecology of sockeye in the Lake Washington system is not completely understood and the effects of a Cedar River Sockeye Hatchery program on the Cedar River sockeye population, other Lake Washington basin sockeye populations, other basin salmonid populations, and the Lake Washington ecosystem as a whole are not fully predictable. The adaptive management approach was chosen as a hatchery management tool to allow better understanding of the performance and effects of the hatchery and promote effective management responses to new information. Adaptive management of the hatchery is intended to increase knowledge about the Lake Washington system and provide the flexibility to incorporate that knowledge into hatchery operations to avoid or minimize adverse impacts on the ecosystem.

The general adaptive management process is illustrated in Figure 1-1. Hypotheses are formulated in advance regarding important uncertainties. As the project begins its operation, data are collected to address the uncertainties. The results from the monitoring studies are then used to evaluate the hypotheses with respect to the project's goals. If a monitoring study finds that a threshold has been exceeded or that a project goal is not being met (e.g., there are impacts on other salmon in the ecosystem) due to hatchery operations, then the parties can decide to make modifications to reduce or avoid such impacts. Monitoring then continues to evaluate the success or failure of the response action, and to address new hypotheses that may be formulated as new issues arise.

While common concerns apply to most hatcheries in varying degrees, each program is unique and requires a customized evaluation program. The major uncertainties presented in this document are specific to the Cedar River Sockeye Hatchery and its operations. The concerns and uncertainties are likely to change over time as questions are answered and new ones become apparent. The results of studies need to be incorporated into the operation of the hatchery to be as successful as possible in meeting the dual objectives of producing returns and limiting impacts. Dr. Robert Naiman of the University of Washington has pointed out a series of steps leading to wise decisions. Samples or other forms of data must be collected, then analyzed to produce information, then interpreted to produce knowledge, then tempered with experience and judgment to produce wisdom. The successful operation of the hatchery will depend on this sequence of steps being unbroken.

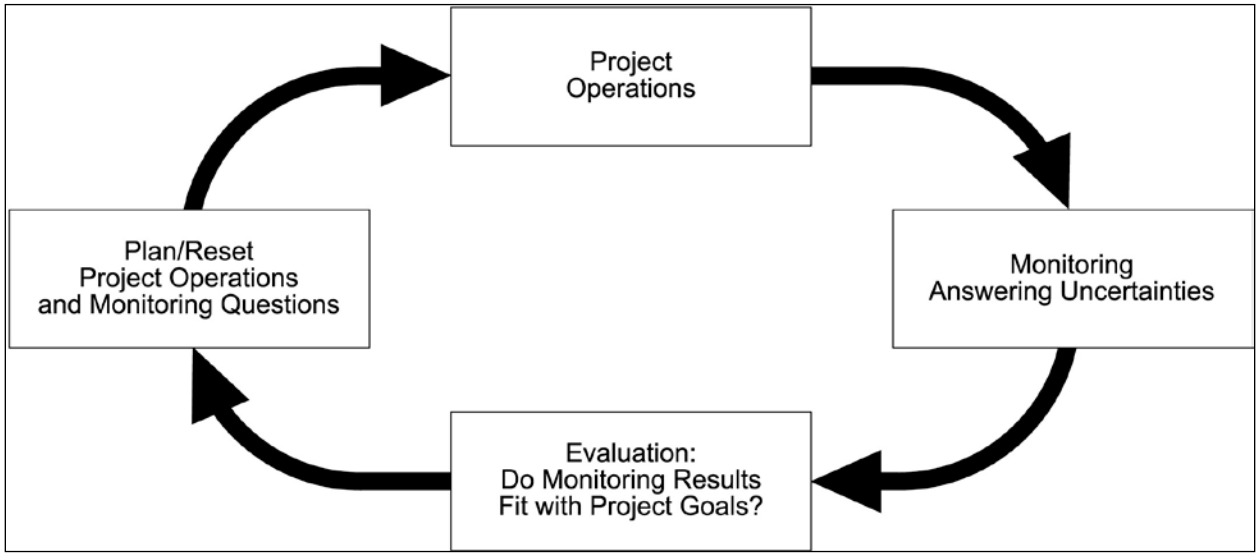

Figure 1-1. General Overview of the Adaptive Management Process

This document identifies only key uncertainties specific to the Cedar River Sockeye Hatchery, not the routine uncertainties that would be encountered in any hatchery program. The key uncertainties are those requiring a higher level of monitoring and research than has typically been available for hatchery programs. For each uncertainty, sections are presented addressing the following topics:

- **Definition and Importance**—This section defines the uncertainty and identifies its importance as it relates to the hatchery goals of producing fry and avoiding adverse ecological impacts.

- **Existing Data and Knowledge**—This section describes past and current research in the Lake Washington basin related to the uncertainty. Efforts were made to adequately represent all research and knowledge that was accessible and available.
- **Remaining Unknowns**—This section describes the ecological issues about which little is known. The unknowns covered are primarily those that have relevance for hatchery operations and meeting project goals.
- **Hypotheses**—This section presents priority hypotheses to be studied during initial project operation.
- **Monitoring and Research Plan**—This Adaptive Management Plan (AMP) has been prepared based on information available at a particular point in time. The results of studies underway may allay some of the concerns or heighten others. A proposed research and monitoring program has been outlined; final determination of the elements of the program will be made as part of the formal adaptive management process. This section provides an overview of how each hypothesis identified in the previous section should be studied. Contracted researchers will develop detailed study plans at a later date. Detailed study plans will include a power analysis when appropriate, which specifies necessary sample sizes, minimum detection levels, and appropriate significance levels so that there is confidence in study results and the ability to make management decisions based on them. This section identifies recommended study durations; however, studies could be continued or discontinued depending on initial study results and guidance of the technical work group. This section also includes a budget for investigation of these hypotheses (in 2001 dollars). The budget allocations in this document focus on the first 10 years of operation and could shift over time as knowledge is gathered.
- **Adaptive Management Actions**—This section describes potential outcomes for each monitoring and research hypothesis. For each outcome, potential management responses are listed. These responses are recommended strategies that could reconcile project operations with the project goals. However, the recommended strategies are subject to change as more information or different technologies become available. Ultimate management responses will be decided through the management process, as described in Section 4.

1.3 SUMMARY

This Adaptive Management Plan presents a technical discussion of the five major uncertainties in Section 2. The information for each uncertainty is then summarized in Section 3 of this document. The last section presents a strategy, principles, organization and decision process for the AMP.

This document is offered as a basis for discussions between appropriate parties to reach agreement on management roles and relationships and the responsibilities and authorities of participants. It has been prepared with the following goals:

- To provide a starting point for initiating the required research and monitoring of the ecosystem
- To establish an evaluation and management process to respond effectively with the full range of issues that may arise within the context of the hatchery program.

SECTION 2.
KEY UNCERTAINTIES

The proposed Cedar River Sockeye Hatchery is designed to increase the average number of Cedar River sockeye salmon and to minimize or avoid adverse effects on the following:

- The existing sockeye population in the river
- Other sockeye salmon populations in the Lake Washington system
- Salmonid species in the basin
- The overall health of the Lake Washington ecosystem.

There is sufficient experience with hatcheries elsewhere to justify concern about these effects, though it is far from certain that they will occur. In this AMP, key areas of uncertainty are defined so that hypotheses can be constructed and tested through monitoring and evaluation. Information generated from this process will provide a basis for scientific evaluation and ultimately serve as the basis for changing the program to better meet project goals. Uncertainties and hypotheses are expected to change over time as questions are answered and new ones emerge. Five major uncertainties are presented below.

2.1 UNCERTAINTY NO. 1—ARE HATCHERY AND NATURALLY PRODUCED FRY SIMILAR IN SIZE, GROWTH, AND MIGRATION TIMING, AND AT A STABLE POPULATION COMPOSITION?

2.1.1 Definition and Importance

Until recently, the Cedar River population was composed of wild sockeye salmon. Since operation of the interim hatchery began, it has been composed of both hatchery and naturally produced sockeye. The intent is to maintain the natural attributes of this composite population so that fish of both origins can spawn successfully in the river. In keeping with this intent, there is a stated objective to keep naturally and hatchery produced fry "comparable." Here, the term "fry" refers to individuals who have absorbed their yolk and either emerged from the gravel volitionally or have been released from the hatchery. Due to the difference between hatchery conditions and those in the river incubation environment, there is concern that the hatchery fry might differ from their naturally produced counterparts. The differences would be important if hatchery fry exhibited a handicap or an advantage compared with natural fry that could lead to shifts in the composite nature of the sockeye population and ultimately, affect the fitness of the sockeye population that spawns in the river.

The definition of "comparable" can be applied in many ways. For this AMP, it is important to use qualities that can be quantitatively compared, and can provide a basis for conclusions about similarities between hatchery and naturally produced fry. Comparisons of size, growth, and migration timing of the two groups of fry are instructive because they influence survival rates and can be examined in a way to produce statistically strong

results. In addition, it is possible to track the composition of the fry population to ensure that a balance of natural and hatchery fish is maintained.

The interpretation of the results of comparisons between hatchery and naturally produced fry needs to recognize the potential factors that may influence differences. For example, fry to adult survival rates can be influenced by emergence and release location, flow, feeding, time of day of release or emergence, time of year and other factors as well as by genetic influences. Comparisons that are influenced by as few variables as possible are more likely to lead to more accurate interpretations of cause and effect than those where many potential variables may influence results. Due to the number of variables potentially affecting results, comparisons of fry to adult survival are not a useful method for evaluating relative fitness between hatchery and natural fry. Fry to adult survival rates will be calculated and compared, however, in the effort to better understand factors affecting survival in general.

2.1.2 Existing Data and Knowledge

Research on hatchery and naturally produced sockeye salmon has been conducted at several juvenile stages. These stages include the fry stage when the fish are migrating out of the Cedar River into Lake Washington, the "pre-smolt" stage when they are in Lake Washington in March or April (about one to two months before they leave for salt water), and the "smolt" stage when the fish are leaving the Lake Washington system and entering Puget Sound through the Hiram Chittenden Locks (locks).

The Washington Department of Fish and Wildlife (WDFW) started sampling fry near the mouth of the Cedar River in 1992, the same year of initial releases from the interim hatchery. The fry-trapping program allows estimation of the number of fry entering the lake from the Cedar River and the natural-hatchery composition of the fry population. Table 2-1 presents the Cedar River fry production estimates and population composition for the 1991-2000 brood years. The hatchery component of the sockeye fry population has varied between 6 and 87 percent since 1991, with an average of 29 percent.

In addition to estimating the fry population, fry trapping can provide information on migration timing and fry size. Migration timing studies have shown that hatchery fry typically reach the lake before naturally produced fry, with the median migration date ranging from 8 to 46 days earlier for hatchery fish. Table 2-2 summarizes the median migration dates for hatchery and naturally produced fry in calendar years 1992 to 2002. The difference in migration timing could be due to factors such as the timing of egg take, the temperature of incubation water, and selective mortality of embryos in the river. Comparison of 2000 egg take timing and the spawning curve indicates that egg take did not occur before spawning in the river in that year (Figure 2-1). Data from 1999 indicated a similar pattern. However, the spawning curve given is based on counts of fish both spawning and migrating within the river and the true spawning time in the river could be later. However, most of the difference in migration timing is thought to be a result of the temperature of the spring water used to incubate eggs in the hatchery, which is slightly warmer than the water in the river.

TABLE 2-1.
CEDAR RIVER FRY ESTIMATES GENERATED FROM THE FRY TRAPPING STUDIES CONDUCTED NEAR THE MOUTH OF THE RIVER

Brood Year	Sampling Year	Total Fry Production	Hatchery Fry (Percent of Total)	Naturally Produced Fry (Percent of Total)
1991	1992	10,400,000	600,000 (6%)	9,800,000 (94%)
1992	1993	28,800,000	1,700,000 (6%)	27,100,000 (94%)
1993	1994	24,700,000	6,600,000 (27%)	18,100,000 (73%)
1994	1995	14,300,000	5,600,000 (39%)	8,700,000 (61%)
1995	1996	5,800,000	5,100,000 (87%)	730,000 (13%)
1996	1997	38,300,000	13,900,000 (36%)	24,400,000 (64%)
1997	1998	32,700,000	7,600,000 (23%)	25,400,000 (77%)
1998	1999	18,500,000	9,000,000 (49%)	9,500,000 (51%)
1999	2000	12,000,000	3,000,000 (25%)	9,000,000 (75%)
2000	2001	52,400,000	14,500,000 (28%)	37,900,000 (72%)
2001	2002	43,600,000	12,000,000 (27%)	31,600,000 (73%)
2002	2003	42,300,000	14,400,000 (34%)	27,900,000 (66%)
2003	2004	47,900,000	9,200,000 (19%)	38,700,000 (81%)
	Average	28,600,000	7,900,000 (28%)	20,700,000 (72%)

Sources: Seiler 1994; 1995, Seiler & Kishimoto 1996; 1997A; 1997B;Seiler et al 2004A, 2004B, 2005A, 2005B

TABLE 2-2.
MEDIAN MIGRATION DATES OF HATCHERY, NATURALLY PRODUCED, AND COMBINED SOCKEYE FRY IN THE CEDAR RIVER FROM 1992-2004

Brood Year	Sampling Year	Median Date			Difference N-H (days)
		Natural	Hatchery	Combined	
1991	1992	3/18	2/28	3/12	18
1992	1993	3/27	3/07	3/25	20
1993	1994	3/29	3/21	3/26	8
1994	1995	4/05	3/17	3/29	19
1995	1996	4/07	2/26	2/28	40
1996	1997	4/07	2/20	3/16	46
1997	1998	3/11	2/23	3/06	16
1998	1999	3/30	3/03	3/15	27
1999	2000	3/27	2/23	3/20	32
2000	2001	3/10	2/26	3/06	12
2001	2002	3/25	3/04	3/18	19
2002	2003	3/08	2/24	3/03	12
2003	2004	3/21	2/23	3/15	26
	Average	**3/24**	**3/01**	**3/14**	**23**

Source: Seiler et al 2005B

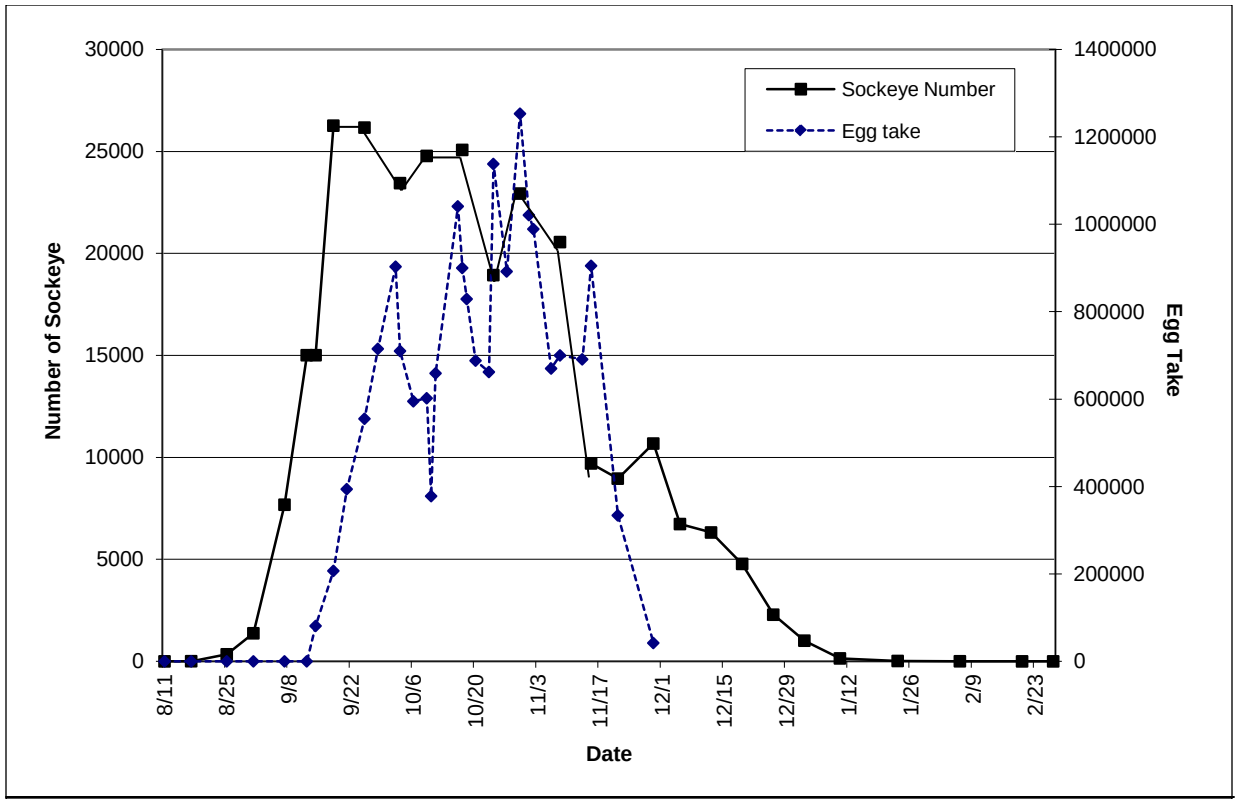

Figure 2-1. 2000 Egg Take Timing at the Hatchery and Counts of Live Sockeye in the Cedar River (WDFW data).

In the past, a portion of the outmigrating fry were measured at the fry trap. The average fry size is 29 mm (± 1 mm). The size of hatchery and natural fry at this time is assumed to be similar, as hatchery fry are not reared (David Seiler, WDFW, pers. comm.).

The fry trapping data allows estimates of in-river survival of some hatchery fry and the relationship between their survival, their release site along the river, and conditions during migration. Survival of naturally produced fish from the time of egg deposition to the time they reach the migration trap and the relationship between those survival rates and river discharge are estimated based on estimates of escapement and fecundity. In general, in-river survival of hatchery fry increased with river discharge during migration (Seiler and Kishimoto 1997b). For naturally produced fry, survival rates were negatively correlated with river discharge during the incubation period (Seiler and Kishimoto 1997b). Higher river discharges during egg incubation apparently decrease survival by mobilizing riverbed sediments, resulting in bed scour (Ames and Beecher 2001).

Pre-smolt surveys have been conducted each year in March or April. Scientists use these data to estimate the number of sockeye juveniles that are about to leave the system that year, as well as determine their average size. The results of these studies are forthcoming and will be regularly integrated into the AMP process.

Since 1995, studies on salmon smolts have been occurring at the locks. These studies mostly focus on chinook smolts, but also address the travel time, travel speed and residence time of coho and sockeye salmon and steelhead trout. These studies have not examined

sockeye size or other hatchery-related topics (Fred Goetz, U.S. Army Corps of Engineers, pers. comm.).

2.1.3 Remaining Unknowns

What mixture of natural and hatchery production is adequate to maintain ecological integrity of the Cedar River population?

The intent of the hatchery program is to boost production in the system without significantly lowering the ability of the sockeye population to successfully reproduce in the river. Therefore, there is a desire to keep a stable and healthy balance between the number of hatchery and naturally produced sockeye salmon at all life history stages. Based upon hatchery objectives, a population of 100 percent hatchery fry would represent a failure. However, it is not known at what point the population composition is balanced.

Based upon fisheries management policy and early analysis by the science panel (Brannon et al. 2001), the population composition should be about 50 percent hatchery and 50 percent natural returning adults (see the Capacity Analysis for a further discussion). If we assume that survival is roughly equal between the two groups after the incubation stages, then 50 percent would be the target composition at the fry stage. However, there are several unknowns about this composition from an ecological standpoint:

- It is not known how a 50 percent hatchery population would affect the ability of the population as a whole to spawn in the river.
- Given the effects of river scour on the natural population, there will be variability in the system depending on river conditions.

Overall, this important question cannot be easily answered. From the policy standards established, it will be assumed that 50 percent hatchery is the acceptable average for hatchery presence in the population. Adaptive management of other uncertainties (e.g., reproductive success, Lake Washington ecosystem health) will help assess this standard over time.

What are the growth, survival, and population composition of Cedar River sockeye fry once they enter Lake Washington?

There are limited data on the size and growth of hatchery and naturally produced sockeye fry in Lake Washington (Schroder memo, WDFW, 2005). The WDFW has been conducting pre-smolt estimates within the lake since the late 1960s or early 1970s. It is hoped that the results from these studies can be examined to identify trends in the size and growth of sockeye fry at the pre-smolt stage over the last 20+ years to provide a baseline for average size and growth, their variability, and relationship to density. Through establishing a baseline, it will be possible to detect any difference that might be seen in the Cedar River population as hatchery production increases. The otoliths of sockeye salmon produced at the interim hatchery have been marked by exposure to distinct thermal regimes, so those caught in the pre-smolt surveys are identifiable as hatchery or naturally produced. These samples will provide a basis for examining size differences between hatchery and natural fry at this stage and estimating the population's composition (hatchery and natural).

What are the growth, survival, and population composition of Cedar River sockeye smolts migrating through the locks?

Research on smolt passage at the locks has been conducted since 1995; however, there are no available data on sockeye size, growth, or hatchery-natural composition at this life stage. It is difficult to justify quantification of smolts as hatchery or natural as it would require lethal sampling that would affect other sockeye populations in the basin. In addition, pre-smolt sampling that occurs one to two months prior to smolt migration provides a comparable time point because much of the in-lake growth and mortality has likely taken place by this time. Due to these facts, the AMP focuses on pre-smolt sampling. However, smaller sample sizes will be used to establish ratios of hatchery smolts to wild smolts and their relative sizes.

2.1.4 Hypotheses

The following hypotheses will guide research and monitoring studies for this uncertainty:

- There is no difference in migration timing between hatchery and naturally produced fry.
- At the time of emergence, there is no difference in size of hatchery and naturally produced fry.
- The average proportion of hatchery fry in the Cedar River sockeye population does not significantly exceed 50 percent.
- At the time of pre-smolt surveys, there is no difference in size of hatchery and naturally produced fry.
- At the time of pre-smolt surveys, the proportions of hatchery and naturally produced sockeye do not differ from those that entered the lake as fry.

2.1.5 Monitoring and Research Plan

Migration Timing

Migration timing of sockeye population in the Cedar River should continue to be examined through fry trapping at the mouth of the river. The hatchery is designed to contain equipment to alter the water temperature in the hatchery to more closely follow the temperature of the river. Studies of migration timing should start when the new hatchery begins operation and continue for up to eight years to determine the effectiveness of this activity in matching the migration timing of hatchery and naturally produced fry. The developmental rate of salmon embryos is closely controlled by temperature, and after a few years it may be clear that only careful monitoring of temperature regimes is necessary to project emergence timing.

Fry Size at Emergence

Examination of naturally produced fry trapped at the mouth of the Cedar River can readily determine the size of these fry. Samples will need to be collected throughout emergence at the hatchery to provide comparable data. Fry retained for otolith analysis should have their length and weight recorded so that an average, range and variance for hatchery and

naturally produced fry can be calculated. These studies will coincide with those on migration timing, and will depend on the results of all fry trapping studies.

Fry Population Composition

The population composition of Cedar River fry should continue to be monitored. The composition estimates should cover years of varying escapement and river conditions to provide an accurate idea of the average and variability. These studies will occur over the first eight years of hatchery operations, coinciding with migration timing and fry size studies, and further data collection will be dictated by the results of all fry trapping studies.

Pre-Smolt Size and Growth

Annual pre-smolt surveys should be supported to allow comparisons of size and survival between hatchery and naturally produced fry, identified by otoliths. Comparison between sizes of fry entering the lake the previous spring and size of pre-smolts should allow growth estimation for the two groups.

Comparison of the relative survival and growth of sockeye fry will be complicated by the presence of naturally produced fry from other tributaries in the system (notably but not exclusively Bear Creek). These fish, if not accounted for, would influence the size and growth estimates of naturally produced Cedar River fry. It might be necessary to quantify the size of fry from northern lake tributaries and determine if any differences exist between the Cedar River and other sockeye fry populations. If there are no differences, then it could be assumed that there is not a high amount of bias in the growth and size estimates of naturally produced Cedar River fry due to presence of other wild sockeye populations. Study plans will account for this complication in their design.

In addition, it should be possible to collect scales from adult salmon (e.g., from fishery sampling) and back calculate their size as smolts. By also examining the otoliths, one could compare sizes of hatchery and naturally spawned fish. Scales removed from fully mature salmon can be difficult to read so recoveries at the hatchery and spawning grounds might not be suitable for such analysis.

This study should be conducted annually for up to 10 years and could be combined with studies of lake carrying capacity (see Uncertainty #5).

Pre-Smolt Population Composition

During pre-smolt surveys, fish should be collected to recover otoliths and identify the proportion of hatchery and naturally spawned fish for comparison with the proportions of hatchery and naturally produced fry entering the lake to determine if there is a difference in survival. As with the assessment of growth, the presence of wild fry from populations besides the Cedar River will complicate this analysis. Some idea of the contribution of sockeye from other tributaries to the lake population should be obtained. Ideally, fry would be trapped from the major tributaries (Issaquah Creek and Bear Creek) but in the absence of such data the abundance of these groups of fry might be estimated from counts of adults in the creeks and estimates of fry production from assumed survival rates or short-term field studies. In years when the basin's population is dominated by the Cedar River, this may not cause much error, but large escapements to sites other than the Cedar River will

weaken the analysis of fry to pre-smolt survival rates. Study plans will address this complication when developed. This monitoring will occur in the same years as fry population composition to allow for comparison data (initially, years 1 through 8).

Budget

The Habitat Conservation Plan (HCP) budget allocated a total of $662,480 (1996 dollars) for fry trapping and counting and $378,560 for fry marking and evaluation for 50 years. For each year, between 1 and 8, $41,405 was allocated for fry trapping and counting. Fry marking and evaluation is allocated $23,660 per year for years 1 through 8.

Table 2-3 provides a breakdown of the HCP allocation for the category each hypothesis falls into and the estimated amount that each study would cost. It should be noted that the pre-smolt survey cost is estimated at $19,000 and is not a specific HCP commitment. Nevertheless, HCP funding and other sources have been identified to continue this monitoring activity due to its importance and efforts will be made to continue to support pre-smolt surveys.

2.1.6 Adaptive Management Actions

Migration Timing

Potential Study Outcomes

For migration timing, the potential study outcomes are as follows:

1. There is no significant difference in the migration timing of hatchery and naturally produced fry.
2. There is a significant difference in the migration timing of hatchery and naturally produced fry.

Threshold

If the timing of wild and hatchery runs differed, the process described in Section 4.8 will be followed to determine the cause and identify steps needed to rectify it. The timing of the migrations would be deemed "different" if statistical analysis of the distributions (e.g., test of means or medians, depending on the normality of the data) indicated a less than 5 percent chance that they were similar in two years out of five.

The unfavorable outcome would be a significant difference in migration timing between the two groups, which could lead to reduced survival of hatchery fish.

Currently there is a difference in migration timing between hatchery and naturally produced fish. To adjust the hatchery timing to more closely resemble the timing of naturally produced fish, the hatchery is to alter water temperatures to mimic the temperatures in the river. Initial study results will determine whether that is an effective method to fix the differential in migration timing. After implementation of water chilling, if a difference in migration timing is still found, other corrective measures would need to be developed.

TABLE 2-3.
ANNUAL BUDGET ALLOCATION FOR HYPOTHESES RELATED TO SIMILARITY IN FRY SIZE, GROWTH, AND MIGRATION TIMING BETWEEN HATCHERY AND NATURALLY PRODUCED FRY, AS WELL AS THE CEDAR RIVER JUVENILE POPULATION COMPOSITION

		HCP Allocation		AMP		
Hypothesis	HCP Budget Category	Years	Amount[a] (per year)	Years[b]	Estimated Cost (per year)	Comments
Migration Timing	Fry migration timing and size	1-8 24-27 42-45	$41,405	1-8	$40,000[c]	Conduct with size and composition studies
Fry Size	Fry migration timing and size	1-8 24-27 42-45	$41,405	1-8	$40,000[c]	Conduct with timing and composition studies
Fry Population Composition	Fry marking and evaluation	1-8 24-27 42-45	$23,660[d]	1-8	$83,000[e]	Conduct with size and timing studies
Pre-Smolt Size and Growth	None	—	—	Each year	$19,000	Funding from other sources
Pre-Smolt Population Composition	Fry marking and evaluation	1-8 24-27 42-45	$23,660	1-8	$15,000[f]	Funding from other sources

a. Total amount allocated to all activities within that budget category (1996 dollars).
b. Study years within the first ten years of the hatchery only. Further studies will be decided through analysis of study results.
c. The total fry trapping cost is $80,000, which includes both WDFW overhead and trapping for all species of salmon in the Cedar River. The City contributes about $40,000 annually.
d. This covers $23,000 for fry marking in the hatchery.
e. This estimate includes $23,000 for fry marking in the hatchery, plus subsequent otolith analysis assuming 150 otolith samples per night for 30 nights at $13 per otolith.
f. Estimate is for otolith analysis only. Boat time and sample collection are included under the pre-smolt size and growth estimate.

Table 2-4 includes additional factors that could cause earlier migration timing of hatchery fish and ways to change operations to reduce the influence of that factor. At this time, it appears that the egg take timing does not begin before spawning in the river; however, this condition should be further analyzed if water temperature corrections are not effective.

TABLE 2-4.
FACTORS (OTHER THAN WATER TEMPERATURE) THAT COULD CAUSE EARLIER MIGRATION TIMING OF HATCHERY FISH AS COMPARED TO NATURALLY PRODUCED FISH AND POSSIBLE METHODS OF CORRECTION

Factor	Method of Correction
Collection of too many hatchery fish at the beginning of the spawning season.	Further study of egg take timing and river spawning timing. If a contributing influence of egg take timing is found on differential migration timing, the egg take/broodstock collection schedule should be altered to reduce the number of eggs/fish taken at the beginning of the run and increase the number of eggs/fish taken later in the run.
High density of alevins in the incubator promoting more rapid development	Alevin density can affect development rates. However, this relationship is also influenced by flow and substrate depth (Derek Poon, U.S. E. P. A., pers. comm.). Incubator conditions should be altered if this is a factor in earlier migration timing (e.g., reduced density, changes in water flow rates).

Fry Size Before Entering Lake Washington

Potential Study Outcomes

The potential study outcomes for this hypothesis are:

1. There is no difference in size of emergent hatchery and naturally produced fry from the Cedar River.
2. There is a difference in fry size of emergent hatchery and naturally produced fry from the Cedar River.

Threshold

If the lengths of natural origin and hatchery fry differed, the process described in Section 4.8 will be followed to determine the cause and identify steps needed to rectify it. The size of the fry would be deemed "different" if statistical analysis of the distributions (e.g., test of means or medians, depending on the normality of the data) indicated a less than 5 percent chance that they were similar in two years out of five.

The unfavorable outcome for this study would be a difference in fry size between the two groups. Abnormally small fry from the hatchery would have a handicap, resulting in low post-release survival rates. Large hatchery fry would have competitive advantages that would increase survival, complicating integration of natural origin and naturally produced fish. Size differences as small as 2 to 3 mm can greatly affect swimming performance and predator avoidance (Bams 1967), which ultimately affect fry survival. The difference in survival would alter the balance in the composite population. Different factors influencing fry size are listed in Table 2-5 with their potential methods of correction.

TABLE 2-5.
FACTORS THAT COULD CAUSE A DIFFERENCE IN THE SIZE OF HATCHERY AND NATURALLY PRODUCED FRY AND POSSIBLE METHODS OF CORRECTION

Factor	Method of Correction
Direct or indirect selection of females for the hatchery with respect to body size, causing selection for egg size.	Ensure that broodstock collection methods result in random selection of females.
Hatchery rearing	Do not rear fry. Release them as soon as possible after volitional emergence.
Incubation substrate	Provide sufficient incubation substrates to avoid excessive alevin activity.

Pre-Smolt Size and Growth

Potential Study Outcomes

Potential outcomes for this research hypothesis are:

1. The size and growth of hatchery and naturally produced pre-smolts in Lake Washington are similar to each other.
2. The size and growth of hatchery and naturally produced pre-smolts in Lake Washington are significantly different from each other.

Threshold

If the lengths, weights, or condition factors (weight-length relationships) of natural origin and hatchery pre-smolts differed, the process described in Section 4.8 will be followed to determine the cause and identify steps needed to rectify it. The size of the pre-smolts, based on spring sampling, would be deemed "different" if statistical analysis of the distributions (e.g., test of means or medians, depending on the normality of the data) indicated a less than 5 percent chance that they were similar in two years out of five.

The undesirable outcome would be a difference in size and growth between the two groups. The potential causes of growth differential are listed in Table 2-6 along with potential methods of correction.

TABLE 2-6.
FACTORS THAT COULD CAUSE DIFFERENTIAL GROWTH BETWEEN HATCHERY AND NATURALLY PRODUCED PRE-SMOLTS AND POSSIBLE METHODS OF CORRECTION

Factor	Method of Correction
Physiological condition causing an advantage or disadvantage in foraging and avoiding predators	Examine and alter size or attributes of fry leaving the hatchery/adjust release strategy.
Timing of release from the hatchery	Adjust the timing of hatchery fry to better match that of the naturally produced fish (see Table 2-4).

Pre-Smolt Population Composition

Potential outcomes of this hypothesis study include:

1. There is no difference between fry and pre-smolt population composition.
2. Hatchery pre-smolts represent significantly less than or greater than their proportion in the fry population, after accounting for fry produced outside the Cedar River.

The undesirable outcome would be more than 50 percent hatchery pre-smolts in the lake sockeye population (after accounting for other Lake Washington sockeye populations), or a decline in hatchery contribution to the overall population. Table 2-7 lists potential causes for a change in the proportion of hatchery pre-smolts in the Cedar River population and potential remedies.

TABLE 2-7.
FACTORS THAT COULD ALLOW A CHANGE IN THE REPRESENTATION OF HATCHERY FISH IN THE PRE-SMOLT POPULATION AND POSSIBLE METHODS OF CORRECTION

Factor	Method of Correction
Higher survival of hatchery fry while in the lake due to size or release date.	See correction methods under fry and pre-smolt size, growth and timing (see Tables 2-5 and 2-6).
Selective pressures favoring survival of hatchery pre-smolts over natural pre-smolts.	This would be difficult to measure and would likely have to be conducted with studies of the lake ecosystem if thought to be a significant factor.
Under-representation of hatchery fry caused by disease or behavior impairment.	Increase scrutiny of fry leaving the hatchery for health and minimize practices that could induce maladapted behavior.

2.2 UNCERTAINTY NO. 2—DOES THE HATCHERY REDUCE THE REPRODUCTIVE SUCCESS OF CEDAR RIVER SOCKEYE SALMON?

2.2.1 Definition and Importance

Reproductive success is the number of progeny produced per adult that survive to reproduce themselves. There are several components of reproductive success, including the number and size of eggs produced by females, their competence in selecting, preparing and defending breeding sites, and the survival of their offspring after emergence. For males, reproductive success depends on the ability to gain access to ripe females and fertilize eggs, and the survival of those embryos. Reproductive success is a complex function of individual traits (chiefly related to body size and date of spawning), density-dependent processes (including competition for breeding space by adults, competition for food by offspring, and predation), and environmental factors such as flooding in the river where spawning and incubation occur and temperature in the lake and at sea. Reproductive success is therefore a result of intrinsic, genetically influenced individual traits as well as processes extrinsic to the individual fish.

The life history patterns (e.g., size and age at maturity, egg size, spawning date, etc.) of populations are evolutionary adaptations to maximize reproductive success. The Cedar River population is not native, and the low reproductive success of the population (that is, few returning adults per spawner) may in part reflect the mismatch between genotype and environment. Reduction in reproductive success of the naturally spawning population would reduce the overall productivity of the system and might accelerate the decline of the naturally spawning population. Operation of the hatchery could affect reproductive success through various processes.

First, the hatchery might reduce the reproductive success of the naturally spawning population by removing some selective pressures on reproductive traits such as courtship and redd site choice. By spawning fish at random in the hatchery, smaller or weaker fish that would be at a disadvantage in the river might produce as many offspring as stronger individuals. Through time this can alter the reproductive success of the population.

Second, there might be some alteration in the genetic composition of the hatchery population ("domestication selection") rendering them more fit for the hatchery and less fit for natural conditions. Such inadvertent selection has been documented, and at least some of the poor performance of hatchery-origin steelhead spawning in rivers compared to sympatric wild steelhead may result from this process (Chilcote et al. 1986; Leider et al. 1990), although steelhead hatcheries rear their fry for a year or more while the sockeye hatchery would be releasing the fry soon after they leave the incubators.

Third, the hatchery may tend to select for phenotypes that are natural but that do not represent the full spectrum of the naturally spawning population. The adults have an unusually protracted period of spawning (from September until December or even later) compared to other sockeye salmon populations. It is not clear whether this reflects recent evolutionary adaptation to the Cedar River and Lake Washington basin or ancestral patterns. Baker Lake sockeye, from which the Cedar River population is thought to be largely derived, do spawn over a similar time period (late September to December; Washington Department of Fisheries et al. 1992). There is a strong genetic basis for spawning timing in salmon, and other life history traits tend to co-vary with spawning date such as body size, energy and reproductive allocation (Hendry et al. 1999), and the location of spawning. Assuming the present condition reflects natural selection in the Lake Washington basin, a change in the temporal and spatial distribution of spawning might reduce the reproductive success of naturally spawning salmon in the future.

2.2.2 Existing Data and Knowledge

Some data on the age, size, egg size, fecundity, and morphology of Lake Washington (including Cedar River) sockeye were reported by Quinn et al. (1995) and Hendry and Quinn (1997). WDFW has been conducting research on sockeye returning to the Cedar River. Their data includes an examination of size, fecundity, egg size, and age at maturity of hatchery and naturally produced fish. These data are currently being analyzed and will be considered in the adaptive management process as they are available.

In addition to research on phenotypic traits, there have been several studies of the genetic structure and ancestry of Lake Washington basin sockeye (e.g., Hendry et al. 1996, 2000; Bentzen and Spies 2000; Spies et al. 2001; Young et al. 2001). Despite this work, there is

considerable uncertainty about the origins and present structure of the populations. It seems most likely that the present Cedar River population was derived from transplants from the Baker Lake system in the 1930s and 1940s, though it is difficult to rule out contributions from other transplants. Moreover, the existence of small native sockeye and kokanee populations in the Lake Washington system (though probably not the Cedar River) seems likely but it is difficult to be certain which (if any) present populations represent pure "native" sockeye.

Results of adult carcass collection for 1997-2000 are presented in Fresh et al (2003). They conclude that in some comparisons that hatchery origin female sockeye were significantly smaller than those of natural origin females of the same age. They also conclude that there are differences in adult distribution during spawning and that the broodstock collected to date are timed earlier than the overall run. They found no significant differences in age at maturity or return timing between hatchery and natural origin returns.

2.2.3 Remaining Unknowns

Is there a trend in body size, fecundity and egg size through time?

Many Pacific salmon populations, including ones in the Puget Sound area, have experienced declines in body size over the past decades; in others there is evidence of significant annual variation. There are many possible reasons for this, including but not limited to, changes in smolt size (including hatchery effects), changes in age composition of spawners, temperature regimes and competition for food at sea, and selective fishing. Declines in size may manifest themselves in reduced fecundity (Washington and Koziol 1993). It is possible that changes in growing conditions in the lake (i.e., smolt size) could affect age composition and fecundity, however, this relationship has not been examined in Lake Washington. It is possible that data from ongoing studies or retrospective analysis of existing data could shed light on this question.

What is the relationship between spawning date and location of spawning?

Sockeye salmon that return early to the Cedar River tend to spawn in the upper reaches of the river to a greater extent than those returning later (Ames and Beecher 2001). Recoveries of otoliths from experimental groups released from the hatchery into the upper, middle and lower reaches of the river indicated that adults tend to return to the site where they were released more often than would occur by chance (Fresh et al 2003.). During the period of evaluation, samples taken during the broodstock collection period, suggesting that hatchery returns tended to favor upstream spawning areas more so than naturally produced sockeye. It is likely that naturally spawned fry emerging from specific reaches of the river will return to those reaches, resulting in partial segregation of the run in space and time. There is abundant evidence that early and late spawning salmon differ in longevity and other life history traits (Perrin and Irvine 1990; Hendry et al. 1999), and so timing is not merely a random variable but is associated with other important adaptations. Therefore, it is important to understand how adults returning over the course of the spawning season distribute themselves in the river.

2.2.4 Hypotheses

Abundance, life history patterns, and genetic structure of salmon populations are not fixed. Some variation is both inevitable and beneficial. Nevertheless, some changes would foreshadow declines in fitness and are cause for concern. The following null hypotheses will guide initial monitoring and research studies for this uncertainty:

- The size and age composition of the population at maturity of Cedar River sockeye will not show a trend over time.
- The relationships between body size, fecundity and egg size of female sockeye in the Cedar River will remain constant.
- The spatial and temporal distribution of spawning will remain constant over time.
- There will be no difference in reproductive success between hatchery and naturally produced sockeye spawning naturally.
- There will be no trend toward lower overall reproductive success of naturally spawning sockeye over time.
- The genetic composition of the Cedar River sockeye population will not change over time.

2.2.5 Monitoring and Research Plan

Size and Age at Maturity

To investigate size at age, adult sockeye should be sampled for otoliths or scales to determine age and their length should be measured. This will allow a long-term comparison of size at maturity to determine if sockeye are becoming smaller or if the age composition is changing. As part of routine operations, a sample of the adult salmon spawned at the hatchery and carcasses retrieved from the river need to be measured and their otoliths removed to assess the proportion of hatchery and naturally produced fish. Body size measurements should use the same methods each year (e.g., mid-eye to hypural plate) and ages of naturally spawned fish should be validated using otoliths of known-age hatchery fish. Size data should be collected at the hatchery annually from fish spawned on each egg-take date. Otolith collection, at both the hatchery and in the river, should occur in years 1-10. Lengths of fish spawning in the river should also be collected during years 1-10. Further data collection will depend on initial study results and analysis.

A broodstock collection site located as close as possible to the mouth of the Cedar River would allow collection of a random sample of sockeye as they migrate. The location of the broodstock collection facility used for the interim hatchery limits access to later returns and to downriver spawners. A sampling approach could then be developed to gather samples that accurately characterize the sockeye run.

Fecundity and Egg Size

Female body size, egg size, and fecundity should be examined over time to determine if any decrease is occurring in the population. Study methods should include taking female

lengths, weighing the total mass of fresh (i.e., not water-hardened) eggs she produces, and collecting a small number (about 50) for separate weighing and counting. This should provide an accurate estimate of egg size, fecundity, and gonadosomatic index. These females should also be sampled for otoliths to determine age and origin (hatchery or river). This should allow detection of any differences in reproductive output between natural and hatchery fish, and among hatchery treatment groups. Relationships between size, age, egg size, and fecundity can also be examined.

Spawning Date and Location

To examine how spawners returning at different times over the spawning run distribute themselves in the river, tagging studies should be conducted. Adult sockeye should be trapped at the mouth of the river or the broodstock collection facility at various times during the spawning run and tagged. Recovery surveys should then be conducted to trace where those fish go in the system and ultimately spawn. These studies could be conducted in connection with tagging and movement studies of sockeye in the lake as well (see Uncertainty No. 3), and should be connected with length, age, and otolith examination.

Reproductive Success

The null hypothesis is that after one or more generations of breeding in the hatchery, the reproductive success of naturally spawning sockeye salmon will not differ between individuals whose parents were bred in the hatchery and those whose parents were not. Under this hypothesis, hatchery-bred fish spawning in the river (from the first years of the hatchery) would produce progeny that could not be distinguished from naturally spawning fish, so only the effects of a single generation of hatchery production could be assessed.

This hypothesis could be tested by allowing adults (of unknown parentage) to enter and spawn in a discrete area such as a spawning channel. Otolith examination (post-mortem) would determine their origin and DNA parentage analysis (from fin-clips of adults and fry) could determine whether the *per capita* fry production differed between naturally spawning and hatchery parents. This assessment would depend on having a mix of naturally spawning and hatchery parents; if all the parents were hatchery produced then no light would be shed on the question. This would not be known until after the spawning had taken place, and so the study should be conducted in a season when an approximately equal ratio is expected. This study should be conducted in years 1-2 and repeated in years 9-10.

In addition to this direct (albeit somewhat controlled) comparison, the reproductive success of the two groups could be compared in an indirect, less controlled manner. Knowing the number of females that spawn in the river each year and estimating (from otolith examination) the proportion of hatchery females, will allow comparison of the number of fry produced per female among years with varying proportions of hatchery females. The drawbacks to this method are that many years of data would be required and that other factors affecting fry production (notably density, flow, and variation in spawner distribution) would have to be considered in the analysis.

The possibility of the population becoming progressively less fit for natural reproduction will have to be evaluated. This is complicated by non-genetic factors (notably flooding during incubation and flow-related survival during migration by fry to the lake). However,

a decrease in the flow-adjusted survival rate over time would be cause for concern because even under present conditions the naturally spawning population is barely replacing itself. To evaluate this possibility, adult to adult survival for hatchery and natural origin groups within year and over time will be evaluated along with fry production per capita for naturally spawning sockeye.

Genetic Composition

Life history traits such as spawning date and body size reflect both genetic and environmental influences. In addition to these phenotypic traits that are subject to natural selection and affect fitness, there are biochemical and molecular traits that appear neutral to selection and are not influenced by environmental conditions. Such traits have been used to test hypotheses regarding ancestral origins and present population structure in the basin (Hendry et al. 1996, 2000; Bentzen and Spies 2000; Young et al. 2001). Because the different variants of the alleles apparently confer no fitness benefits, there is no "ideal" genetic composition that needs to be maintained. Rather, it is generally believed that levels of genetic diversity, as indicated by these traits, are associated with the overall health of the population (Ryman 1991; Waples 1991). In addition, shifts in gene frequency might be associated with changes in adaptive traits not being measured.

Over the past few decades there have been many very rapid changes in the tools used for studying the genetic composition of populations, and we might anticipate further advances in this scientific discipline (Carvalho et al. 1994). Progress has been made, not by rejecting early techniques (e.g., polymorphic proteins) but by adding other techniques and markers (e.g., mitochondrial and nuclear DNA). It therefore would be unwise to recommend any particular technique for genetic analysis. Rather, it will be most important to collect and archive samples from a fraction of the naturally and hatchery produced salmon, and from other spawning populations in the basin, such as Bear Creek. Annual processing of these samples will be unnecessary and no specific management action would result from small changes in the frequency of alleles in the population. However, it would be prudent to conduct analysis on a periodic basis to track trends over time. Genetic studies should occur at the end of the first decade of hatchery operations (years 9-10), in conjunction with reproductive fitness studies.

Budget

The HCP budget allocated a total of $567,840 over the life of the project to monitor phenotypic and genetic traits, tentatively budgeted as $35,490 per year for years 1-4, 9-12, 28-31, and 46-49. Otolith recovery from returning adults was budgeted at $47,320 per year for years 1-12, 28-31, and 46-49. These years were presumably selected to permit collection of the returning adults that had been marked in the earlier years (24-27 and 42-45) and to parallel genetic analyses. Table 2-8 presents the allocated and estimated budgets.

TABLE 2-8.
BUDGET ALLOCATION FOR HYPOTHESES RELATED TO REPRODUCTIVE FITNESS AND GENETIC COMPOSITION OF CEDAR RIVER SOCKEYE

		HCP Allocation		AMP		
Hypothesis	HCP Budget Category	Years	Amount[a] (per year)	Years[b]	Estimated Cost (per year)	Comments
Size and age at maturity	Otolith recovery from returning adults	1-12 28-31 46-49	$47,320	Size: annual Otoliths: 1-10	$45,000[c]	Conduct in conjunction with fecundity and egg size sampling
Fecundity and egg size	Phenotypic and genetic traits	1-4 9-12 28-31 46-49	$35,490	Annual	Hatchery Operation	Should be a routine hatchery operation
Spawning date and location	None	—	—	1-4	$25,000	Conduct in conjunction with otolith recovery
Reproductive Success	None	—	—	1-2 9-10	$35,000	Combine with genetic composition in all but years 1-4

a. Total amount allocated to all activities within that budget category.
b. Study years within the first ten years of the hatchery only. Further studies will be decided through analysis of study results.
c. Size measurements at the hatchery should be integrated with hatchery operations. Measurements of salmon from the river and otolith extraction and processing are accounted for in the cost estimate. This supplies only a portion of the total amount. A total budget of $167,000 would be required for collection of otoliths in the field and at the hatchery, otolith analysis, fry marking, data analysis and report preparation, and WDFW overhead (Kurt Fresh, WDFW, pers. comm.). $23,000 for fry marking is included in the budget for Uncertainty #1 (see Table 2-3).

2.2.6 Adaptive Management Actions

Size and Age at Maturity

Potential Study Outcomes

Plausible outcomes of this study are as follows:

1. There is no trend in size and age at maturity of Cedar River sockeye over time.
2. There is a trend toward decreasing size at age and increasing age at maturity, or increasing size at age and decreasing age at maturity of Cedar River sockeye over time.

Threshold

If the size at age or age composition of natural origin and hatchery produced adults differed, the process described in Section 4.8 will be followed to determine the cause and identify steps needed to rectify it. The size of the adults, based on random samples from the weir, would be deemed "different" if statistical analysis of the distributions indicated a less than 5 percent chance that they were similar in two years out of five.

Length at age data would be examined by analysis of variance with age and brood year as factors. Age composition would be tested by a chi-square contingency test or other test for categorical data. In addition, there might be a progressive trend that was not significant in a few years but was evident over time. To test for such a trend, the average length at age 1.2 (the modal age for this population) would be calculated for natural origin and hatchery adults. We would first test for a significant trend in each population, and then if the slopes differed significantly from 0 (i.e., there was evidence of a trend) we would compare the slopes from the two groups. These regression relationships would be calculated annually.

The undesirable outcome would be significant differences in age at maturity or size at age between hatchery and natural origin adult returns. Table 2-9 lists the potential causes of this outcome and possible methods of correction.

TABLE 2-9.
FACTORS THAT COULD CONTRIBUTE TO DIFFERENTIAL SIZE AND AGE AT MATURITY FOR CEDAR RIVER SOCKEYE AND POSSIBLE METHODS OF CORRECTION

Factor	Method of Correction
Alteration of size-selective pressures in the hatchery.	Through AMP, review hatchery procedures and adjust as appropriate.
Smaller smolts spending more time in the ocean.	Assess smolt size and reduce the production of fry if the changes are serious enough to compromise the population's productivity. Adjust release strategy.
Changes in growing conditions at sea.	Nothing, but need to incorporate these changes into forecasts for capacity and egg needs.

Fecundity and Egg Size

Potential Study Outcomes

Plausible outcomes of this study include:

1. Egg size and fecundity of returning female Cedar River sockeye remain unchanged over time, as absolute averages and as functions of body size.
2. There is a reduction or increase in egg size and fecundity relative to body size of returning female sockeye salmon in the Cedar River over time.

Threshold

Egg size and fecundity will be examined by ANOVA with origin (natural or hatchery) and brood year as factors. Such analysis does not consider differences in body size, however. Accordingly, the data will also be examined using ANCOVA (analysis of covariance) with length as the covariate to determine if the natural and hatchery produced fish differ in reproductive output as a function of body length. To test for trends over time we will use both the raw mean egg size and fecundity data and size-adjusted data by using the expected value for each year at a fixed length. That is, we will calculate the slope of the length-fecundity relationship for each year and then estimate the fecundity of females of a given length (e.g., 60 cm) in each year. If any significant patterns are detected, the process described in Section 4.8 will be followed to determine the cause and identify steps needed to rectify it.

The undesirable outcome would be a reduction in egg size or fecundity in females. Table 2-10 lists the potential causes of these reductions and possible methods of correction.

TABLE 2-10.
FACTORS THAT COULD CONTRIBUTE TO REDUCED EGG SIZE AND FECUNDITY IN CEDAR RIVER SOCKEYE FEMALES AND POSSIBLE METHODS OF CORRECTION

Factor	Method of Correction
Smaller female body size results in fewer or smaller eggs.	Determine whether the decline is related to growth rate or age at maturity, and examine ecological processes and possible inadvertent selection in the hatchery. Ensure broodstock is representative at the run.
Slower growth in fresh water could result in fewer, larger eggs relative to body size. (Might not be true for sockeye.)	Consider reducing fry production if the changes are serious enough to compromise the population's productivity.
Slower growth at sea results in fewer, larger eggs relative to body size, or more rapid growth results in more, smaller eggs.	Nothing, but need to incorporate these changes into forecasts for capacity and egg needs.

Spawning Date and Location

This subject examines the pattern of spatial and temporal distribution and the co-variation of these traits with life history patterns and with hatchery/natural origin. The first need for this study is to determine the prevailing patterns, building on detailed work done in 1969 (reported by Ames and Beecher 2001). The second need is to determine whether the hatchery might be affecting these patterns.

Potential Study Outcomes

Plausible outcomes of this study include:

1. The spatial and temporal distributions of spawning by sockeye in the Cedar River are independent.

2. There is a tendency for earlier (or later) returning salmon to spawn predominately in the upper (or lower) section of the river.
3. The timing and spatial distribution of salmon is independent of their life history traits (e.g., size, age, in-stream life)
4. Large body size and longer in-stream life are associated with early arrival or upstream distribution.
5. The hatchery-origin salmon tend to return earlier than naturally spawned salmon.

Threshold

The weighted average spatial distribution (corrected for missing values) as indicated by WDFW live counts of sockeye in the Cedar River will not show a significant change over the years, nor will there be changing interactions between date and location of spawning. Changes from year to year might result from a variety of physical factors, density, etc. and might not indicate an underlying shift in the behavior of the salmon. Accordingly, only progressive shifts of the same nature (e.g., fewer fish spawning at upriver locations) will be considered important, not merely differences in distribution from one year to the next. Such changes will be assessed by separating the river into discrete reaches and binning the counts into these reaches for the temporally discrete surveys each year. If any significant patterns are detected, the process described in Section 4.8 will be followed to determine the cause and identify steps needed to rectify it if the change is related to hatchery practices.

The undesirable outcome would be a tendency for the hatchery broodstock collection to disrupt the natural pattern of spatial and temporal distribution, and co-variation of spawning date with life history traits (notably size and in-stream life). Table 2-11 lists the potential causes of changes in the population and possible methods of correction.

TABLE 2-11.
FACTORS THAT COULD CONTRIBUTE TO DIFFERENTIAL SPAWNING TIMING AND LOCATIONS FOR CEDAR RIVER SOCKEYE AND POSSIBLE METHODS OF CORRECTION

Factor	Method of Correction
Broodstock collection practices disproportionately remove a portion of the population in space and time.	Alter broodstock collection schedules to more accurately represent the entire run and encourage full utilization of the river.
Harvest in Lake Washington removes a specific portion of the population.	Determine patterns of lake entry, movements, upriver migration and spawning date and location (see Uncertainty No. 3). Shift broodstock collection practices to spread harvest over the entire run.
Predominant releases of hatchery fry in the lower river.	Sacrifice survival rate to provide full use of the upper river by releasing fry upriver.
Disruption of space-time continuum.	Make sure that fry from early spawning are predominantly released in the upper river and later fry released downriver, if this is the natural pattern.

Reproductive Success

Potential Study Outcomes

Potential outcomes of this hypothesis study include:

1. Hatchery and naturally produced sockeye have similar rates of reproductive success when spawning naturally, and there is no overall trend in fitness over time.
2. Hatchery sockeye have lower rates of reproductive success when spawning naturally than do naturally produced sockeye, and there is a decreasing trend in productivity over time.

Threshold

Estimates of the number of natural origin sockeye salmon fry leaving the Cedar River each year will not show either a significant downward trend over the years, nor a significant correlation with the proportion of hatchery origin spawners in the parental generation. The production of fry is related to both the number of spawning adults and also the peak river discharge during the incubation period. Therefore, the multivariate relationship between fry production and these variables will be calculated, and the residuals from this relationships will be examined from either a time trend or a correlation with the relative abundance of hatchery origin parents. Alternatively, analysis may have to be limited to years with relatively low peak flows (< 100 m3/sec) because when flows are high the survival rates of embryos are so low that there would be little power to detect patterns related to origin or year. If any significant patterns are detected, the process described in Section 4.8 will be followed to determine the cause and identify steps needed to rectify it if the change is related to hatchery practices.

Comparison of adult to adult return rates for hatchery and natural origin sockeye will be made. The adult to adult return for hatchery origin sockeye is expected to exceed that of natural origin sockeye due to the survival benefit of the protected hatchery environment during incubation. The magnitude of this difference will be evaluated each year and over time. Multivariate trend analyses would determine if within year differences in survival rates of the same magnitude over time.

The undesirable outcome would be differential reproductive success between hatchery and naturally produced sockeye or a decreasing trend in fitness in the population over time. Table 2-12 lists the potential causes of the reduced fitness in the population and possible methods of correction.

TABLE 2-12.
FACTORS THAT COULD CONTRIBUTE TO DIFFERENTIAL REPRODUCTIVE SUCCESS FOR CEDAR RIVER SOCKEYE AND POSSIBLE METHODS OF CORRECTION

Factor	Method of Correction
Relaxation or alteration of sexual selection processes	Alter spawning methods at the hatchery to more closely follow natural conditions. However, this alteration in hatchery methods would not be easy as sexual selection processes are not well understood in natural systems.
Inadequate contribution of naturally produced sockeye salmon to the population.	Increase the target goal of naturally produced adults above 50 percent.

Genetic Composition

Potential Study Outcomes

Potential outcomes of this hypothesis study include:

1. There is no change in the genetic composition of Cedar River sockeye salmon over time, as measured by molecular markers.
2. There is a reduction in genetic diversity in Cedar River sockeye salmon over time.

Threshold

The possible loss in genetic diversity will be assessed using three indicators: 1) the average number of alleles per locus (or the total number of alleles across a standard set of loci), 2) the level of heterozygosity in the population, and 3) the effective population size (Ne), measured on an absolute basis or relative to the total population (i.e., ratio of Ne/N). Significant changes at any of these three indicators would result in initiation of the process described in Section 4.8 to ascertain what might be causing the changes and what steps might be taken to reverse them.

The undesirable outcome would be a reduction in genetic diversity or a dramatic change in genetic composition caused by hatchery practices. Some change, however, is not necessarily undesirable as evolution is a natural process as the population fluctuates randomly and in response to environmental changes. Table 2-13 lists the potential causes of genetic change in the population and possible methods of correction. Note, however, that it is unclear what level of change constitutes a problem. Genetic changes might be difficult to adjust because their correlation with adaptive traits is unknown.

TABLE 2-13.
FACTORS THAT COULD CONTRIBUTE TO A CHANGE IN GENETIC COMPOSITION FOR CEDAR RIVER SOCKEYE AND POSSIBLE METHODS OF CORRECTION

Factor	Method of Correction
Relaxation of selective pressures during spawning and incubation.	This is inherent in hatchery practices and probably cannot be corrected.
Selection of unrepresentative salmon for spawning.	Increase efforts to randomly select broodstock to ensure that the tails of the distribution of traits, including timing, size, shape are represented.
Inappropriate breeding scheme.	Consider a different breeding scheme, based on models of genetic drift.

2.3 UNCERTAINTY NO. 3—WILL THE HATCHERY ADVERSELY AFFECT SOCKEYE POPULATIONS OUTSIDE THE CEDAR RIVER?

2.3.1 Definition and Importance

The Cedar River and hatchery are part of the Lake Washington basin that includes other populations of sockeye salmon and kokanee, the non-anadromous form of the species. Kokanee populations spawn in Bear Creek, Issaquah Creek and other creeks. Sockeye also spawn in the Bear and Issaquah Creek systems, as well as other creeks and on beaches of Lake Washington. These populations are important components of the basin's biodiversity and the overall production of sockeye salmon. They probably include ancestral lineages of *O. nerka* in the basin that pre-date the transplants in the 1930s and 1940s. The sustainability of these putative populations is desirable from the standpoints of both production and conservation. There are several mechanisms through which the sockeye and kokanee populations in the basin could be affected by the hatchery: increased fishing pressure, ecological effects, or genetic effects.

The most direct mechanism by which the hatchery might affect other sockeye salmon populations is by increased fishing pressure, which could reduce other populations below replacement levels. This concern is common to all populations in the basin but is most acute for the beach-spawning sockeye salmon. They are relatively scarce and predominantly spawn in the southeastern section of the lake, so fisheries might be expected to exploit them more than populations migrating to the Sammamish River or Lake Sammamish. If the hatchery increases the number of Cedar River sockeye salmon in excess of the production needs of the hatchery and the river's escapement goal, there will be fisheries to catch the surplus. The more successful the overall production of sockeye from the Cedar River and from the hatchery, the more frequent or heavy the fisheries in Lake Washington will be. Natural populations are expected to be less productive than the hatchery-supplemented population (this is, after all, the point of the hatchery) and could be over-fished, causing their decline or extinction. This can be averted only if the fisheries are managed, in space or time, to catch primarily Cedar River fish. Present fishery management restricts the time, quantity, and location of tribal and recreational fisheries. Each year, the Muckleshoot Tribe and the WDFW evaluate counts of sockeye salmon at the locks from early June to late July. These counts help determine whether a sufficient number of fish have returned to the

system to support fisheries without compromising the escapement goal. If the counts are sufficient, the fishery is typically open in July for a matter of weeks, until the surplus fish are caught. Cedar River sockeye are targeted during fishing openings and, to avoid catch of northern lake tributary sockeye, fishing activities are restricted to the region of the lake south of the Evergreen Point Bridge (Highway 520), under the assumption that sockeye migrating to the north end of the lake will predominantly occupy the area north of the bridge. However, the beach spawning populations in the lake may mix with Cedar River fish, making it difficult to manage separately due to mixing and their small population.

The second mechanism by which the hatchery might affect the other sockeye salmon populations is through changes in the lake's ecosystem. This uncertainty is addressed in detail below (Uncertainty No. 5).

Third, it is possible that the hatchery might affect the genetic composition (hence the fitness) of other populations. This might occur if significant numbers of Cedar River sockeye strayed and interbred with the other populations.

2.3.2 Existing Data and Knowledge

There has been some research conducted on the genetic structure of various Lake Washington sockeye and kokanee populations. The extent to which these populations are discrete, and which (if any) represent an ancestral lineage has been a subject of considerable research (Hendry et al. 1996; Hendry et al. 2000; Spies et al. 2001; Young et al. 2001) with no absolutely certain conclusions. It is not clear whether further genetic research will resolve the uncertainties surrounding the population structure and ancestry of this species in the basin.

A study of sockeye straying rates from the Cedar River hatchery population into Bear Creek was conducted in 1998, 1999 and 2000 with otolith examination. The level of straying into Bear Creek was negligible since no Cedar River hatchery sockeye were found. While some level of straying might have been detected if the sample size of the study had been increased, the study concluded that hatchery strays, if any, would represent significantly less than 0.5 percent of the Bear Creek adults (Fresh et al. 2001). Straying to other creeks, such as Issaquah Creek, would probably be even less frequent, as they are farther from the Cedar River than Bear Creek. Some level of straying is a natural process in salmon and is not necessarily reason for concern. This issue can be regarded as minor unless hatchery practices are changed markedly from those relevant to the study by Fresh et al. (2001). For example, releases of fry in the lake rather than the river might elevate straying rates.

2.3.3 Remaining Unknowns

A two-year study was initiated in 2003 to learn more about the spatial distribution of sockeye salmon in the lake prior to their ascent into spawning streams, the distribution of specific populations in the lake prior to spawning, and the relationship between date of entry into the lake, population of origin, and spawning date. It also is unknown whether the depth distribution of salmon (hence vulnerability to some fisheries) is similar for all populations and how it changes over the summer. Results from the study are expected to be available in 2006.

What is the distribution in the lake of adults from different spawning populations?

By knowing where spawners headed for the Cedar River and the northern tributaries are located within the lake, as well as the extent of their range over the summer, it would be possible to determine the adequacy of the current harvest management regulations. In addition, if the spatial and temporal location of Cedar River sockeye adults were known, fishing could be further managed to minimize catch of other sockeye populations.

What is the population composition of the sockeye harvest in Lake Washington?

It is unknown whether the fisheries (tribal and recreational) catch similar proportions of the different populations of sockeye in Lake Washington, and what the overall patterns of catch by population are. While the aim is to catch only Cedar River sockeye, other populations, such as beach spawners, are probably caught as well. If we understood the patterns of catch, it would be possible to estimate whether harvest of non-Cedar River sockeye occurs at levels that jeopardize their sustainability. If harvest of other sockeye is a problem, it will be important to identify locations and ranges within the lake for these populations and manage fishing accordingly.

What is the relationship between the date of entry into the lake and spawning location?

By knowing the relationship between entry into the lake, timing of spawning, and spawning location, certain time blocks could be set aside as fishing/no-fishing times to maximize harvest of Cedar River fish, minimize catch of other sockeye populations, and protect against compression of the phenotypes and distribution patterns of salmon.

2.3.4 Hypotheses

The following null hypotheses will guide initial monitoring and research for this uncertainty:

- Sockeye harvest in Lake Washington does not capture sockeye from populations outside the Cedar River at levels greater than their productive capacity.
- There is no significant straying by Cedar River hatchery sockeye into other populations.

2.3.5 Monitoring and Research Plan

Harvest

The spatial and temporal distributions of different populations of sockeye in Lake Washington are being examined through a combination of telemetry and conventional tagging. Representative samples of adults entering the system through the locks were tagged and a fraction of them fitted with ultrasonic transmitters and their movements followed in the lake. The combination of tagging techniques should indicate the extent to which sockeye move throughout the lake and the relationship between migration timing into the lake and spawning timing and location. Sockeye salmon could also be caught from

discrete areas in the lake (e.g., with a purse seine) and tagged, but this is not included in the present study. Recovery of tagged salmon at the Cedar River trap and other spawning areas would indicate the spatial distribution patterns of the salmon.

In addition to these directed research projects, the number of non-Cedar River fish caught would need to be compared to escapements to determine if harvest occurs at unsustainable levels. The combination of these methods would provide strong evidence of the extent to which area closures or timing restrictions are likely to protect non-Cedar River populations. It should be noted that the known beach spawning populations in the lake are quite small (often only 100's of individuals) and that they spawn within the current fishing area. While the pre-spawning timing and distribution of lake spawning sockeye is unknown, there is concern that these small populations could be subjected to harvest rates that are too high through incidental capture during fisheries targeting Cedar River sockeye. These spawning grounds should be surveyed systematically each year.

The tagging studies should occur for up to four years, starting as soon as possible. Further study years should occur in conjunction with changes in harvest regulations. Specifically, in years that regulations are modified, fish harvest should be examined for their population of origin to determine the effectiveness of the new regulations at protecting non-Cedar River fish.

Straying

The results of studies conducted to date indicated that it is unlikely that significant numbers of Cedar River sockeye will stray into other parts of the Lake Washington basin, so this is a much lower priority than studies related to adult arrival, in-lake movements and escapement counts. However, periodic sampling of sockeye otoliths should occur to look for evidence of hatchery-produced fish in all the sockeye salmon spawning grounds in the basin in association with general spawning ground surveys. The study years will depend upon the realized production increases and will be decided by the program management participants.

Budget

A total of $946,400 was allocated to adult survival, distribution, and homing studies for the life of the HCP. Of that $47,320 was allocated for each year in years 1-8 and $35,490 in years 9-10. Table 2-14 presents the budget allocations for studies of harvest and straying.

TABLE 2-14.
BUDGET ALLOCATION FOR HYPOTHESES RELATED TO EFFECTS TO OTHER LAKE WASHINGTON BASIN SOCKEYE POPULATIONS

		HCP Allocation		AMP		
Hypothesis	HCP Budget Category	Years	Amount[a] (per year)	Years[b]	Estimated Cost (per year)	Comments
Harvest of non-Cedar River sockeye	Adult survival, distribution, and homing studies	1-15 21-50	$47,320	1-4	$100,000	Tracking, tagging, and harvest studies
Straying of Cedar River sockeye	Adult survival, distribution, and homing studies	1-15 21-50	$47,320	6, 8, 10	$15,000	

a. Total amount allocated to all activities within that budget category, first 8 years.
b. Study years within the first ten years of the hatchery only. Further studies will be decided through analysis of study results.

2.3.6 Adaptive Management Actions

Harvest

Potential Study Outcomes

Potential outcomes of this hypothesis study include:

1. Observed or projected harvest levels of non-Cedar River sockeye populations during Lake Washington fisheries are sustainable.
2. There is observed or projected harvest of non-Cedar River sockeye populations in Lake Washington fisheries that is not sustainable.

Threshold

Escapement levels of sockeye to Bear Creek have a statistically greater tendency to drop below the historic minimum escapement range in years of harvest compared to years of no harvest. If this occurs, the process described in Section 4.8 will be followed to determine cause and responsive action.

With this study, the undesirable outcome would be significant (unsustainable) harvest of sockeye populations other than the Cedar River, or fisheries that capture a very discrete fraction of the Cedar River population. Table 2-15 lists the potential causes of non-Cedar River sockeye harvest population and possible methods of correction.

TABLE 2-15.
FACTORS THAT COULD CONTRIBUTE TO HARVEST OF NON-CEDAR RIVER SOCKEYE AND POSSIBLE METHODS OF CORRECTION

Factor	Method of Correction
Ineffective fishing regulations due to spatial location of sockeye populations in the lake.	Study the spatial locations of different sockeye populations throughout their time in the lake.
Ineffective fishing regulations due to timing of different sockeye populations passing through the lake.	Study the timing and location relationships between different sockeye runs in the basin. Modify harvest regulations accordingly.
Intermixing of sockeye from different populations while in the lake.	Recommend harvest regulation changes to co-managers to reduce harvest rates or shift fishing to a time when populations are more separated.

Straying

Potential Study Outcomes

Potential outcomes of this study include:

1. There is no significant straying of Cedar River sockeye into other basin spawning areas.
2. There is significant straying of Cedar River sockeye into other basin spawning areas.

Threshold

During the first 10 years, a sample of 100 otoliths should be obtained from the Bear Creek populations biannually and examined for patterns indicating hatchery origin. If 5 or more hatchery fish are detected in the sample more than twice in the 10-year period, or if 7 or more hatchery fish are detected in any year, the process described in Section 4.8 will be followed to discuss the possible causes of the elevated straying and plan steps to reduce it.

With this study, the undesirable outcome would be significant straying of Cedar River fish. Table 2-16 lists the potential causes of straying and possible methods of correction. It is not clear exactly what level of straying of hatchery fish into these populations would constitute a problem. Levels on the order of 1 to 2 percent of the recipient population seem to occur in natural populations (Quinn 1993). NOAA Fisheries stated that two or three successful migrants per generation may be an acceptable target or limit on the straying of Cedar River hatchery fish into Bear Creek (Memo Waples to Robinson, July 24,1998). Other NOAA Fisheries work has viewed straying rates of up to 5 percent of the receiving population as a limit (NOAA Fisheries, 1995).

TABLE 2-16.
FACTORS THAT COULD CONTRIBUTE TO STRAYING OF CEDAR RIVER SOCKEYE AND POSSIBLE METHODS OF CORRECTION

Factor	Method of Correction
Low release site in the river (insufficient experience for imprinting)	Release hatchery fry further upstream from current locations.
Increased relative production of Cedar River fry.	Decrease production levels. Make recommendations to co-managers that will cause harvest of excess adults returning to Cedar River.

2.4 UNCERTAINTY NO. 4—WILL THE HATCHERY PRODUCE ADVERSE CHANGES IN CHINOOK SALMON POPULATIONS?

2.4.1 Definition and Importance

The sockeye salmon hatchery is designed to be benign with respect to other salmonids in the Cedar River. Chinook salmon, one of the other salmonid species in the basin, are part of the Puget Sound Chinook Evolutionarily Significant Unit that is listed as threatened under the Endangered Species Act (ESA). Chinook and sockeye salmon characteristically use different spawning habitats but sympatry, as observed in the Cedar River, is not unprecedented. It is essential that the hatchery not adversely affect the chinook salmon population.

There are several possible modes of interaction between the sockeye hatchery and the chinook salmon population. First, the broodstock collection facility might deter or delay upstream migration (hence distribution, habitat use, and reproductive success) of chinook salmon. Second, large numbers of sockeye salmon returning to the river might disturb the redds of chinook salmon. It is important to note that increased sockeye numbers are not simply a hatchery-related effect but instead are an effect of the mitigation levels identified in the LMA, which is intended to increase the number of sockeye in the river. Lastly, there might be complex ecological interactions involving other species, such as an increase in sockeye salmon fry buffering chinook salmon against predation or sockeye fry serving as a chinook prey item. This last interaction is addressed in Uncertainty No. 5.

2.4.2 Existing Data and Knowledge

Researchers from the City, WDFW, and King County have been conducting studies on chinook spawners in the Cedar River since 1999. Figure 2-2 illustrates the distribution of chinook redds in 1999 and 2003 by river mile (RM). Most chinook salmon spawned above the present location of the broodstock collection weir (RM 6.5) in 1999, 2000 and 2001 (Burton et al. 2001). Twenty nine per cent of the river lies below the location of the broodstock collection weir.

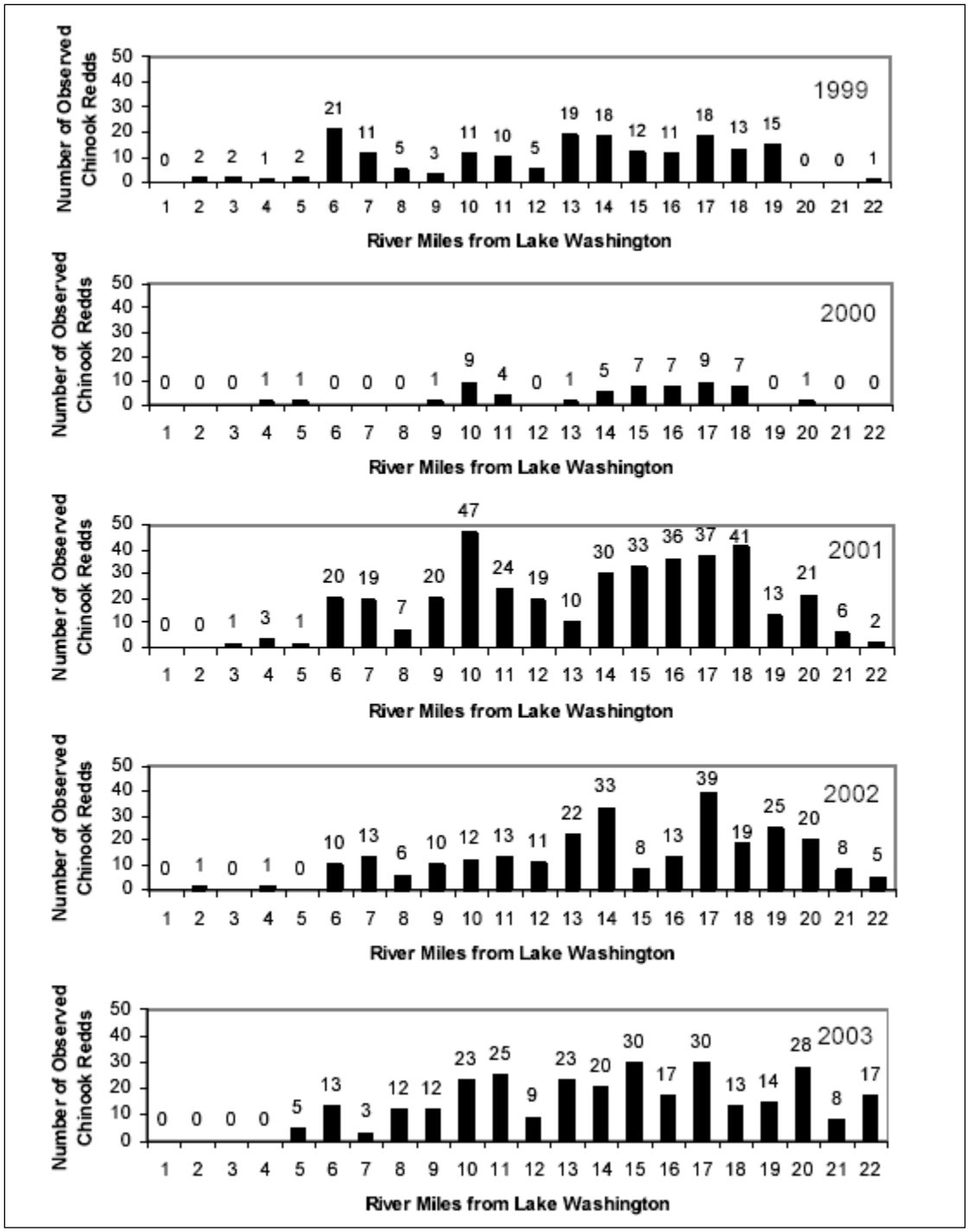

Figure 2-2. Chinook Redd Distribution by River Mile, Cedar River 1999 and 2003 (from Burton et al. 2004).

In 2003, 19 redds (6 percent of the 301 total redds) were noted downstream of the broodstock collection weir. In 2002, 20 redds (7 percent of the 281 total redds) were observed below RM 6.5. In 2001, 36 redds (9 percent of the 398 total redds) were found below the broodstock weir. In 2000, only two redds (4 percent of the 53 total redds) were identified below RM 6.5, while in 1999, 35 redds (19 percent) of the 180 total redds were

observed below the weir. (Burton et al. 2004). This suggests that present collection facilities and their operations do not greatly disrupt upstream distribution.

Studies have also been undertaken on the spawning times of sockeye and chinook. The spawning periods of sockeye and chinook salmon overlap broadly, though the sockeye tend to spawn later and over a longer period at present (Figure 2-3; Cascade Environmental Services 1995; Burton et al. 2001). Thus, later redd excavation by sockeye might disturb chinook redds.

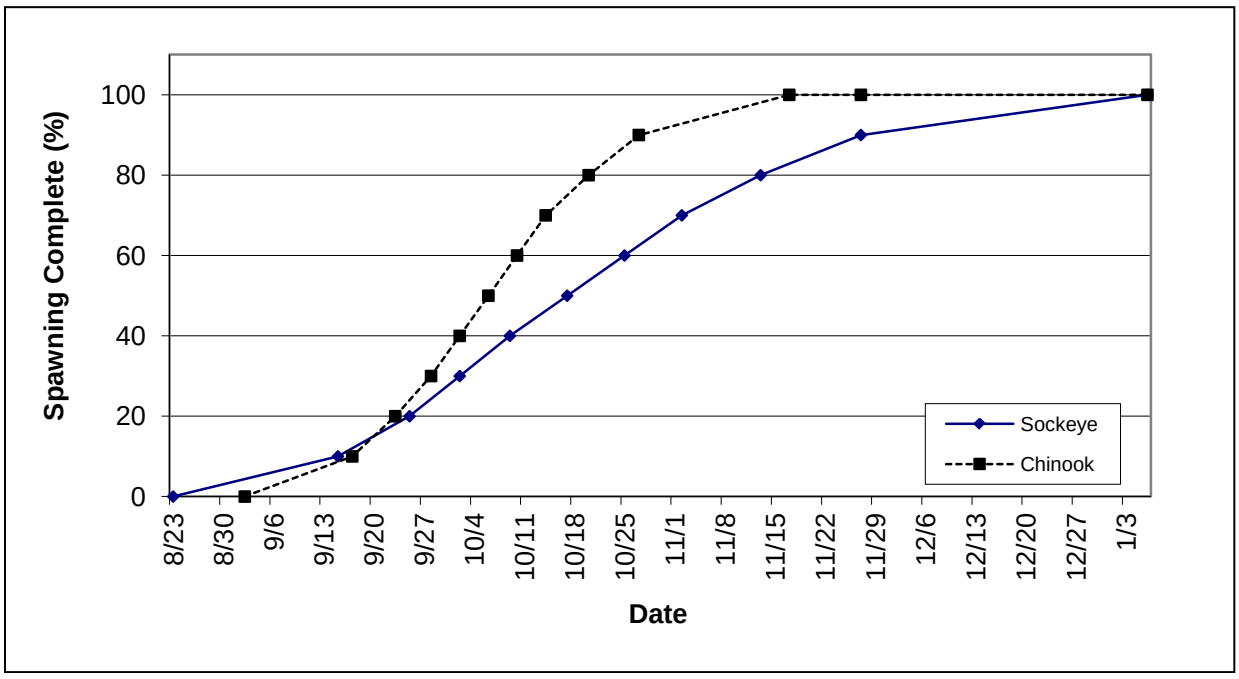

Figure 2-3. Average Historical Spawning Curves for Chinook and Sockeye Salmon in the Cedar River (Cascade Environmental Services 1995)

In 1999, the City, WDFW, and King County made observations about sockeye superimposition on chinook redds. Of the 180 chinook redds observed in 1999, five were observed to experience sockeye spawning activity within close proximity and one chinook redd experienced sockeye redd superimposition. Based on these observations, weekly observations were made in 2000 for 52 out of 53 chinook redds to determine the proximity and extent of sockeye spawning near (within 20 feet) incubating chinook. Twenty-two (42 percent) of the observed redds in 2000 had no sockeye spawning activity within 20 feet of their redd mounds. Twenty-four chinook redds (46 percent) had at least one sockeye redd within 20 feet of their mounds. Sockeye spawned directly on the mounds of six chinook redds (11 percent of the observed chinook mounds; Burton et al. 2001).

The extent of chinook redd damage from sockeye spawning activities is unclear. Egg burial depth is positively correlated with body size (Steen and Quinn 1999), so the embryos of larger chinook salmon might not be greatly disturbed by the digging of smaller sockeye salmon. To assess this possibility, the likely egg burial depth of Cedar River sockeye and chinook salmon were estimated from body size data. The chinook female fork length average was estimated at 772 mm, based on unpublished data provided by Larry Lowe, WDFW. These data, collected as post-orbit to hypural lengths, were adjusted to fork length

using the regression relationship reported by Roni (1992). Using the length-egg burial relationship reported by Steen and Quinn (1999), an average egg burial depth of 22.8 cm for the chinook salmon was estimated. A fork length of 565.5 mm for sockeye salmon was used based on an average of 460 mm mid-eye to hypural length, estimated from data provided by Karl Burton (City of Seattle), Kurt Fresh (WDFW) and Andrew Hendry (University of Massachusetts). The sockeye average egg burial depth was estimated to be 16.7 cm. This is a difference of 6.1 cm in burial depth. However, these estimates are subject to considerable error, as indicated in the reports by Steen and Quinn (1999) and DeVries (1997). It is unclear if a difference of 6 cm is sufficient to protect chinook eggs from damage by sockeye digging.

Cedar River chinook fry are thought to exhibit an ocean-type life history, which typically includes a protracted downstream migration. Fry trapping conducted at the mouth of the Cedar River for sockeye also includes chinook fry and smolt sampling. Trapping is continued through July to adequately trap chinook and understand their timing.

2.4.3 Remaining Unknowns

Will the new broodstock collection facility affect the spawning distribution and reproductive success of chinook salmon?

Since the listing of chinook under the ESA, measures have been taken to avoid delaying their migration at the current weir location. One of the measures includes opening several sections of the weir for fish passage when a chinook is seen holding downstream of the weir. After a chinook is seen holding downstream of the weir for 24 hours, the weir is opened until the chinook passes the weir, or for a period of 12 hours (WDFW 2001). Due to the desire to minimize delay of chinook and to the high number of chinook in the river in 2001, practices often exceeded these protocols. During the 2001 broodstock collection period, the weir was usually opened when chinook were seen in the vicinity of the weir and during some periods the weir was open all night (Brodie Antipa, WDFW, pers. comm.). Data from 1999 and 2000 also suggest that the weir has not significantly delayed chinook migration, based upon their redd location distribution.

However, the replacement hatchery will have a new broodstock collection facility lower on the river. The new facility might affect chinook migration timing and spawning distribution. It is unclear how to determine whether chinook salmon are being delayed, unless they are seen holding below the weir. Perhaps the more important question is whether their spatial distribution is similar to that observed recently (which would assume there is currently no blockage at the weir). The most serious evidence of a problem would be the observation of pre-spawning mortalities of chinook salmon below the weir or much higher densities below the weir than farther upriver.

What is the effect of sockeye redd superimposition on chinook redds?

Based upon the above estimates of chinook and sockeye redd excavation depths, it is unclear if sockeye redd superimposition has significant effects on chinook eggs. The tendency of female salmon to use redd sites excavated by other females, including those of other species (Essington et al. 1998) is known but poorly understood. The critical question is, if smaller salmon (e.g., sockeye) use redd sites containing eggs buried by larger salmon

(e.g., chinook), will the eggs of the larger salmon be disturbed or destroyed? The limited literature on inter-specific and intra-specific density dependence in spawning grounds suggests that this is not a simple matter. In the Weaver Creek Spawning Channel, the reproductive success of pink salmon was not affected by densities of sockeye or chum salmon, even though the latter two species were both larger and spawned later than the pink salmon (Essington et al. 2000). Finally, it should be noted that the hatchery is not projected to increase densities of sockeye salmon spawning in the river beyond those set by the present escapement goal.

2.4.4 Hypotheses

The following hypotheses will guide initial research studies related to this uncertainty:

- Operation of the broodstock collection facility does not significantly delay chinook migration or alter spawning distributions.
- There is no significant damage to incubating chinook eggs from sockeye superimposition on chinook redds or reduced chinook reproductive success.

2.4.5 Monitoring and Research Plan

Chinook Migration and Spawning Distribution

The new broodstock collection facility will need to be monitored to ensure that it does not affect chinook passage. Studies on the spatial distribution of chinook spawning should occur during the first several years of the new facility's operation, and the patterns should be compared to those observed during the past few years. The distribution studies could be similar to current methods, which consist of regular floats of the Cedar River to locate and record chinook redds during the spawning season. In addition, records should be kept at the broodstock collection facility of chinook seen holding downstream and their time of passage, as well as a count of the number of chinook salmon migrating past the collection facility. These records will help evaluate chinook passage times and validate counts in the river. While the count data is not strictly related to the sockeye salmon hatchery, it will be important for determining possible effects of the increase in sockeye numbers on chinook salmon. Chinook and sockeye spawning surveys, along with collection facility observations, should occur annually in years 1-8.

Chinook Redd Superimposition and Reproductive Success

It is neither practical nor acceptable to excavate chinook salmon redds in the Cedar River to determine if there was actual disruption by sockeye salmon digging. Nevertheless, the issue of redd disturbance should be investigated. Initial studies could examine the relationship between the number of chinook fry per female and sockeye densities. Existing data from chinook and sockeye spawning surveys and fry trapping should allow for such a study. Future annual counts of chinook salmon or their redds and fry counts will also be important as hatchery production and sockeye escapement increase.

Observations of sockeye-chinook interactions on the spawning grounds should also be continued. Through annual records of sockeye superimposition on chinook redds,

relationships between sockeye abundance and chinook redd superimposition rates can be followed as hatchery production and sockeye escapement increases.

Studies should occur annually in years 1-8 (in conjunction with fry trapping studies discussed under Uncertainty No. 1). Beyond year 8, studies should occur at various levels of sockeye escapement and hatchery production.

Budget

The Monitoring and Research Program did not allocate funds for chinook salmon studies. Current funding for the recommended activities is supplied by WDFW, the City, and King County. Table 2-17 provides a breakdown of the budget amounts for chinook studies on the Cedar River.

TABLE 2-17.
BUDGET ALLOCATION FOR HYPOTHESES RELATED TO EFFECTS OF THE BROODSTOCK COLLECTION FACILITY AND INCREASED NUMBERS OF SOCKEYE ON CHINOOK REDDS IN THE CEDAR RIVER

		HCP Allocation		AMP		
Hypothesis	HCP Budget Category	Years	Amount[a] (per year)	Years[b]	Est. Cost (per year)	Comments
Chinook Migration and Spawning Distribution	None	—	—	1-8	$35,000[c]	Chinook observations at the broodstock collection facility should be integrated into collection protocols.
Chinook Redd Superimposition and Reproductive Success	None	—	—	1-8	$40,000[d]	Chinook trapping is conducted with sockeye fry trapping. Adult chinook estimates and observations would be funded through the float surveys (above row).

a. Total amount allocated to all activities within that budget category, first 8 years.
b. Study years within the first ten years of the hatchery only. Further studies will be decided through analysis of study results.
c. Estimate is for float surveys only. Funding was $25,000 in 2001, provided by the Instream Flow Committee under the HCP. In 2002, $27,500 will be provided by a King County Conservation District grant, with the remainder supplied by the City.
d. This is current amount allocated for sockeye fry trapping under the HCP. The total cost is approximately $80,000, which includes trapping for all species and WDFW overhead. The remaining $40,000 of the cost is provided by WDFW and King County.

2.4.6 Adaptive Management Actions

Chinook Migration and Spawning Distribution

Potential Study Outcomes

Potential outcomes of this study include:

1. There is no significant delay of migrating chinook at the broodstock collection facility or alteration of spawning distribution.
2. There is a significant delay of migrating chinook at the broodstock collection facility or alteration of spawning distribution.

Threshold

Observations by observers at the broodstock collection facility indicating that more than 5 percent of the chinook that return in a given year are delayed by one day or more will be taken as evidence of delay, and will result in initiating the process described in Section 4.8 to determine the cause and recommend remedial actions. Changes in the spatial distribution of chinook spawning will be inferred from frequency distributions by river mile. There is considerable year-to-year variation (e.g., Figure 2-2). Some changes in distribution might not be consequences of hatchery operations, and some might not be deleterious. However, an increase in chinook salmon spawning below the weir relative to the number spawning above would be cause for concern. A statistically significant increase in the proportion of chinook spawning below the weir will result in initiating the process described in Section 4.8 to determine the cause and recommend remedial actions.

The undesirable outcome would be a significant delay of chinook at the collection facility, as well as an overall change in the distribution of chinook redds in the river. Table 2-18 lists the potential causes of chinook delay and possible methods of correction.

TABLE 2-18.
FACTORS THAT COULD CONTRIBUTE TO DELAY OF MIGRATING CHINOOK AND A CHANGE IN SPAWNING DISTRIBUTION AND POSSIBLE METHODS OF CORRECTION

Factor	Method of Correction
Infrequent collection facility openings.	Modify weir operational protocols to promote rapid passage of chinook.
Trap shyness on the part of the chinook.	Modify the facility to minimize the effect on chinook.

Chinook Redd Superimposition and Reproductive Success

Potential outcomes of this study include:

1. There is no significant damage to incubating chinook eggs from sockeye superimposition on chinook redds and no change in chinook reproductive success.

2. There is significant damage to incubating chinook eggs from sockeye superimposition on chinook redds and a decline in chinook reproductive success.

Threshold

The production of chinook salmon fry and fingerlings from the river is likely to be a function of the number of spawners in the parental generation and the peak flow in the river during the incubation period. A decrease in fry production, after accounting for these variables, or an inverse correlation between fry production and sockeye salmon density in the river will result in initiating the process described in Section 4.8 to determine the cause and recommend remedial actions.

The undesirable outcome would be significant damage to chinook eggs from sockeye redd superimposition. Table 2-19 lists the potential causes of chinook redd superimposition and decreased chinook reproductive success.

TABLE 2-19.
FACTORS THAT COULD CONTRIBUTE TO SOCKEYE REDD SUPERIMPOSITION ON CHINOOK REDDS AND DECLINING CHINOOK REPRODUCTIVE SUCCESS AND POSSIBLE METHODS OF CORRECTION

Factor	Method of Correction
Increase in the number of sockeye spawners or preponderance of late spawning by sockeye.	Alter release locations of hatchery fry or adjust fisheries to keep the escapement close to the goal. The sockeye escapement goal might have to be reduced.

2.5 UNCERTAINTY NO. 5—WILL INCREASED HATCHERY PRODUCTION ALTER AQUATIC COMMUNITY STRUCTURE WITHIN THE LAKE WASHINGTON SYSTEM?

2.5.1 Definition and Importance

Lake Washington serves as the nursery lake for Cedar River sockeye. The lake is a critical transition habitat between the incubation grounds in the Cedar River and other tributaries, and ocean feeding grounds. Hatchery production is expected to increase the number of juvenile sockeye salmon in the lake and this may affect the lake aquatic community. These effects might have ramifications for the hatchery population, other sockeye salmon populations in the basin, and other organisms in the community. These kinds of effects are difficult to predict because of the complex interactions among trophic levels, uncertainty about the factors controlling the abundance of various components of the community, and uncertainty about the future trends in physical factors that might affect the ecosystem. The most obvious ecological interactions involve density, competition and predation.

As stated previously, it is important to acknowledge that an increase in the number of sockeye in the Cedar River and Lake Washington is the intent of the LMA and more generally by the management goals of the co-managers, regardless of whether it is achieved

with a hatchery, a spawning channel, or from increased habitat above Landsburg Dam. Therefore, the potential effects on the Lake Washington ecosystem cannot be simply attributable to hatchery operations, and must be considered in relation to the LMA.

2.5.2 Existing Data and Knowledge

Most of the existing data and knowledge about the Lake Washington ecosystem and its relationship to sockeye are referred to in the background portion of this collection of documents. The following is a brief synopsis of the major important interactions.

- The zooplankton *Daphnia* is the preferred prey item of sockeye in Lake Washington for most of the year.
- *Daphnia* abundance and size, as well as their relationship to thermal regimes and other zooplankton in Lake Washington, has been studied largely by the University of Washington's Department of Zoology. The abundance of *Daphnia* varies seasonally, being scarce in the winter until about April and then being abundant through the fall.
- *Daphnia* are also preyed upon by other fish species, notably longfin smelt and threespine sticklebacks, and one invertebrate predator, *Neomysis mercedis*.
- Smelt prey upon *Daphnia* and thereby compete with sockeye for that resource. However, smelt also prey upon *Neomysis* and reductions in *Neomysis* density appear to release *Daphnia* from strong predation pressures, allowing more food for sockeye. Smelt also seem to buffer predation on sockeye by cutthroat trout (Nowak et al. 2004) and perhaps other piscivorous fish in the years that smelt are abundant.
- Sockeye are preyed upon by many species of predatory fishes, including prickly sculpins, northern pikeminnow (formerly known as northern squawfish), and cutthroat trout. Of these, the trout may be the most important at present and their population seems to have increased over the past decades.

2.5.3 Remaining Unknowns

What is the carrying capacity of Lake Washington for sockeye fry?

Food resources are important because all ecosystems have finite carrying capacities and overabundance of sockeye salmon could reduce the abundance or size distribution of their food resources (chiefly cladocerans and copepods), leading to reduced growth and survival in the lake or at sea. The growth rate of sockeye salmon in the lake is a function of temperature, food quantity and quality, and fish size. In many lakes, the growth of sockeye salmon is density-dependent (see Burgner's 1987 and 1991 reviews). Evidence for the consequences of exceeding the carrying capacity of a lake was provided by the experiments on Leisure Lake, Alaska (Koenings and Burkett 1987). Increasing densities of sockeye salmon fry resulted in progressively smaller smolts, a higher proportion of the smolts leaving the lake after two rather than one year of lake residence, and a smaller total smolt biomass. Thus, concern about exceeding the carrying capacity of a sockeye salmon rearing

lake has basis in experience. However, some attributes of Lake Washington make it different from other sockeye salmon lakes.

The density of sockeye salmon spawning in the Lake Washington basin (expressed as the number of adult salmon per square kilometer of lake area) has not been especially high (Burgner 1991), and the total of the current escapement goal plus the 262,000 adult mitigation level would leave it well within the range for the species (Figure 2-4). In addition, the sockeye salmon smolts from Lake Washington are at the upper end of the range of sizes seen in natural populations in North America (Figure 2-5; Burgner 1991). This growth may result from both the comparatively mild thermal regime and high density of large prey, notably *Daphnia*.

The central question is, "What density of sockeye salmon would depress food resources, leading to reduced growth and subsequent survival of sockeye or other ecologically important species in the lake?" Research in other lakes has indicated that larger smolts are more likely to survive at sea than smaller smolts (Henderson and Cass 1991; Koenings et al. 1993). However, within a given lake, relatively little of the year-to-year variation in marine survival is explained by smolt size. Rather, the larger smolts within a year class enjoy a higher probability of survival than smaller smolts, and lakes with smaller smolts tend to have lower survival rates than lakes with larger smolts. Therefore, while smolt sizes between lakes seem to affect marine survival, it appears that year-to-year variation within a lake system does not greatly affect smolt survival. Indeed, there is even evidence that marine survival may be lower for very large smolts than for those of intermediate sizes (Koenings and Burkett 1987). Nevertheless, decreases in smolt size should trigger concern, especially if accompanied by decreases in survival rates or shifts in age composition.

What is the effect of increased numbers of sockeye on piscivore populations?

In examining predator responses to increased sockeye populations, there might be short-term (i.e., behavioral) responses and long-term (numerical) responses. In the short term, increased abundance of sockeye salmon fry might be expected to decrease per capita predation if the number of predators and the number of prey eaten per predator were fixed. However, if the predators congregated at the mouth of the Cedar River to a greater extent than they do at present or in some other way modified their behavior to "specialize" on sockeye salmon then predation per individual sockeye might not decline. In the longer term, if the abundance of sockeye salmon as prey increased the growth rate or abundance of predators, then the increase in fry abundance might be compensated by increased predation. The likelihood of this possibility will depend on the factors controlling abundance of predators but should be considered, at least conceptually.

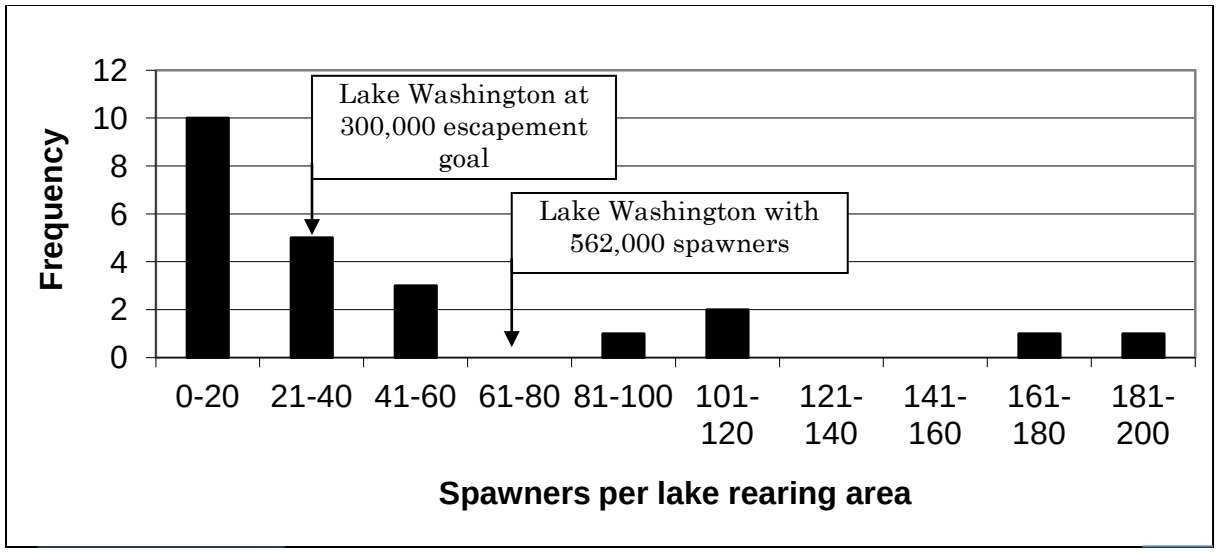

Figure 2-4: Frequency of Lake Spawning Densities for Lakes in the Pacific Northwest, British Columbia, Alaska, and Russia (From Burgner 1991).

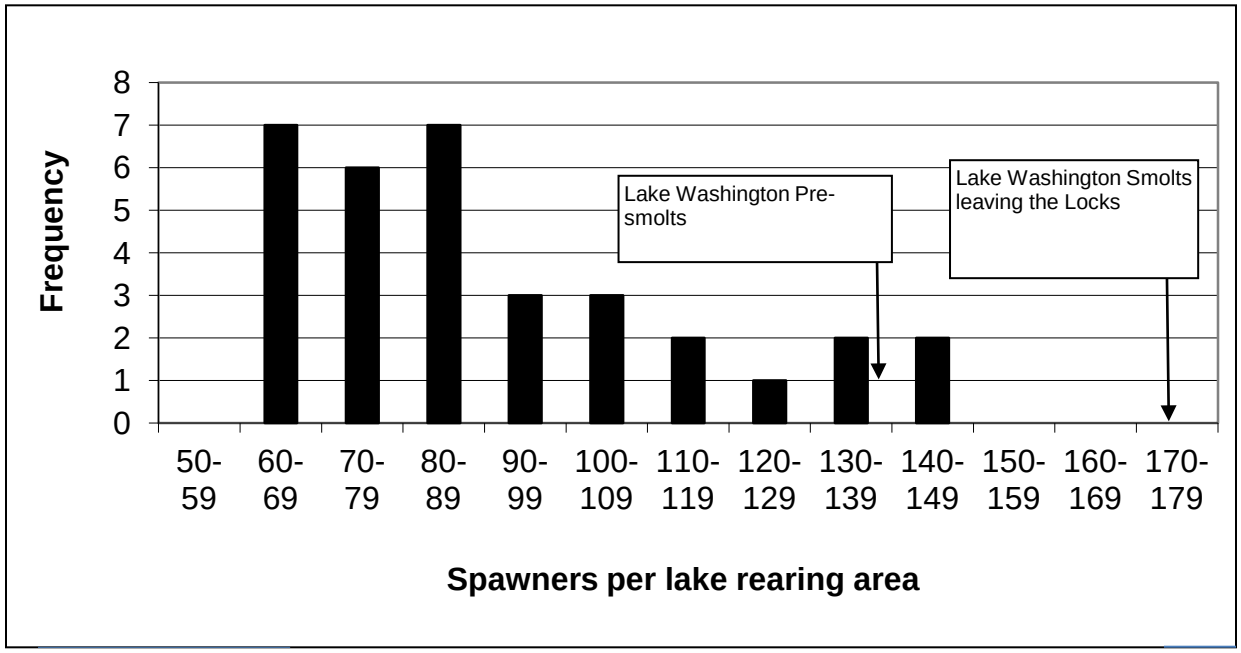

Figure 2-5: Frequency of Average Sockeye Smolt Sizes for Nursery Lakes in the Pacific Northwest, British Columbia, Alaska, and Russia (from Burgner 1991, and unpublished data from K. Hyatt, DFO, Nanaimo, B.C., and Cary Feldmann, Puget Sound Energy, pers. comm..).

How does the abundance of sockeye affect other planktivorous fish?

An increase in sockeye numbers in Lake Washington might also affect competitor species, specifically smelt. The effects that smelt and sockeye have on each other are complicated and cannot be well predicted. An increase in the number of sockeye, and their depletion of prey, could cause a decline in the smelt population. In addition, smelt populations could further be reduced through sockeye-induced predation increases. These reduced smelt populations could subsequently affect sockeye through prey reduction (since the *Neomysis*

population would presumably not be controlled and would consume more *Daphnia*) and decreased prey buffering. The situation is further complicated by the tendency of smelt to have a strong year class followed by a weak one. This makes it more difficult to detect ecological effects and relationships in the lake. In summary, the effects of sockeye upon smelt, and the ramifications for the sockeye population, are unknown and could limit the extent to which increased sockeye production is effective at increasing adult returns. Interactions with the lake's sticklebacks are even less well understood.

2.5.4 Hypotheses

- There is no relationship between sockeye abundance, growth and pre-smolt size in Lake Washington.
- There is no relationship between sockeye abundance and the abundance of predatory fish in Lake Washington.
- There is no relationship between sockeye abundance and the abundance of other planktivorous fish species.

2.5.5 Monitoring and Research Plan

Sockeye Growth

Growth of sockeye in the lake should be examined at various levels of sockeye density. By comparing fry abundance estimates and pre-smolt abundance and size estimates, a relationship between density and growth should be determined. The general description of these methods is discussed under Uncertainty No. 1.

It will be important to include assessment of zooplankton abundance and composition, as well as lake thermal regimes, to be able to account for any variability due to these factors. Abundance of other planktivorous species should also be incorporated since they will influence prey abundance and availability.

Sockeye density and growth data collection should be conducted annually in the first 10 years to track this relationship as hatchery production increases and to account for annual variation. Further study years will be determined through initial study results and direction of program management groups. In general, sampling of pre-smolts and other limnetic fishes is considered part of the baseline assessment needed for the lake.

Predation

It would be very difficult to establish reliable population estimates for fish predators in Lake Washington. Indirectly, predator abundance can be indexed by monitoring the survival of fry to pre-smolt over time. Whether predation will be studied in greater depth, depends on the level of uncertainty associated with predation and that will be determined through the process of establishing monitoring priorities. It is also possible that other entities may see the need for additional information about predator abundance and that this adaptive management program will collaborate with others. Establishing estimates of the major predators in the lake could allow calibration between predator abundance and catches using cheaper, standardized sampling gear (e.g., gill nets for cutthroat trout, northern pikeminnow, and yellow perch; or electrofishing for bass, etc.). This would enable

managers to relate catch rates from lower level monitoring efforts back to abundance. If predator studies are done, cutthroat trout, prickly sculpin, northern pike minnow are a few of the species that should be targeted for abundance estimates. A combination of trawl and hydroacoustic methods could be used. Further data that could be useful are seasonal distributions of these fish and overlap in space and time with sockeye, smelt and stickleback.

Planktivore Abundance

The abundance of other planktivorous fishes such as smelt and stickleback should be evaluated to determine how they might be affected by increased sockeye numbers. In addition, information about their abundance could assist in understanding how all lake planktivores cumulatively affect prey species in the lake. It would be possible to look at the relationship between the density of planktivores and the density of their prey, or the density of prey and growth of planktivores. Again, a combination of trawl and hydroacoustic methods should be used as part of the pre-smolt survey and in the fall as well.

To compare data between these three hypotheses, this study should also be conducted annually in years 1-10 to track changes in the planktivore population as hatchery production increases.

Budget

Funding to address issues related to uncertainties in the lake's carrying capacity and community is designated for year-round studies of the lake's plankton in years 1-4 at $47,320 in 2001 dollars, and springtime sampling of plankton at $8,281 annually for years 5-10, and $16,562 in total for years 11-15. It is recommended that these budget allocations assist with pre-smolt estimates for sockeye abundance and size data, as well as support some predator and planktivore studies. The planktivore studies could be combined with pre-smolt surveys. Table 2-20 provides a breakdown of budget amounts.

2.5.6 Adaptive Management Actions

Sockeye Growth

Potential Study Outcomes

Potential results of these studies include:

1. There is no relationship between sockeye abundance, growth and pre-smolt size in Lake Washington.
2. Increased sockeye abundance is associated with decreased growth and pre-smolt size in Lake Washington.

TABLE 2-20.
BUDGET ALLOCATION FOR HYPOTHESES RELATED TO LAKE WASHINGTON ECOSYSTEM EFFECTS FROM INCREASED SOCKEYE NUMBERS

		HCP Allocation		AMP		
Hypothesis	HCP Budget Category	Years	Amount[a] (per year)	Years[b]	Est. Cost (per year)	Comments
Sockeye Growth	Plankton Studies	1-4 5-10	$47,320 $8,281	1-10	$45,000	Includes zooplankton, and temperature studies. Pre-smolt estimates are conducted by WDFW. Should they be discontinued, funding should be allocated to that as a priority (see costs in Table 2-3).
Predation rates	None	—	—	Unknown	Unknown, depends on scope	Indirect assessment of predation through calculation of in-lake survival of fry to pre-smolt done annually
Planktivore Abundance	None	—	—	1-10	$19,000	Coincident with pre-smolt surveys.

a. Total amount allocated to all activities within that budget category, first 10 years.
b. Study years within the first ten years of the hatchery only. Further studies will be decided through analysis of study results.

Threshold

Every five years, a regression analysis will determine if there has been a significant decline in sockeye smolt size over time [α=.05]. If a significant decline is established, further analysis will be done to determine if food supply has changed, whether the declining trend correlates with lower freshwater or saltwater survival and whether the annual variation in size correlates with sockeye fry abundance. Based on these analyses and others deemed appropriate by the TWG, the TWG will determine if the development of responses as described in Section 4.8 should be initiated. There is no significant relationship between sockeye abundance and pre-smolt size in Lake Washington when analyzed every five years. If a significant relationship is found, then the process described in Section 4.8 will be followed to determine cause and responsive actions.

The undesirable outcome would be decreased size and growth, correlated with increased marine or in-lake mortality for sockeye. Table 2-21 presents possible factors contributing to this relationship and possible methods of correction. It is important to keep in mind that the food web interactions in Lake Washington are complex and it will be difficult or unwise to try any correction methods other than changes in hatchery production.

TABLE 2-21.
FACTORS THAT COULD CONTRIBUTE TO DECREASED SOCKEYE GROWTH AND SIZE IN LAKE WASHINGTON AND POSSIBLE METHODS OF CORRECTION

Factor	Method of Correction
The carrying capacity of the lake is being exceeded.	Reduce hatchery production to levels that are in balance with the lake's prey base and other planktivores.
Temperature of the lake is increasing metabolic costs.	Temperature in the lake has been getting warmer over the past few decades. The mix of global and local causes has not been determined, much less the correction method.

Predation Rate

Potential Study Outcomes

Findings for this hypothesis could include:

1. There is no relationship between sockeye abundance and the rate of predation in Lake Washington.
2. There is a relationship between increased sockeye abundance and increased predation rates on salmonids in Lake Washington.
3. There is a relationship between increased sockeye abundance and decreased predation rates on salmonids in Lake Washington.

Threshold

[The following assumes that chinook PIT tagging at the Cedar River will continue and that an index of survival associated with predation can be developed] If a significant relationship is established between predation rates (3-year rolling average), as indicated by PIT tagging and detection of chinook smolts between the Cedar River and the Ballard locks and sockeye abundance (as measured by pre-smolt estimates on the year of outmigration), then the process described in Section 4.8 will be followed.

If fry to pre-smolt survival drops below the historic range for two years out of five, the adaptive management review process described in Section 4.8 will be initiated.

The undesirable outcome would be a correlation between increased numbers of sockeye and increased rate of predation on them. Table 2-22 presents possible reasons for this predatory increase and possible methods of correction.

TABLE 2-22.
FACTORS THAT COULD CONTRIBUTE TO RATE OF PREDATION IN LAKE WASHINGTON AND POSSIBLE METHODS OF CORRECTION

Factor	Method of Correction
Increase in the number of sockeye fry.	Reduce production in the hatchery; adjust release strategy.

Planktivore Abundance

Potential Study Outcomes

The possible outcomes of this hypothesis are:

1. There is no relationship between sockeye abundance and the abundance of other planktivorous fish species.
2. Increased sockeye abundance is associated with altered abundance of other planktivorous fish species.

Thresholds

If a significant relationship is established between sockeye abundance and smelt abundance when analyzed over a 10 year period and taking into account the biennial variation in smelt abundance, then the process described in Section 4.8 will be followed.

If a significant inverse relationship is established between sockeye abundance and smelt size, while taking into account the two-year cycle for smelt abundance, then the process described in Section 4.8 will be followed.

The undesirable outcome would be an increase in sockeye and a decrease in other planktivores (i.e., smelt and stickleback). Table 2-23 presents possible factors contributing to the reduced number and possible means of correction. It is unclear how changes in body size or abundance of such competitors should be viewed in the absence of observable effects on sockeye salmon. The smelt population varies greatly in abundance between odd-numbered and even-numbered years, and the mean lengths vary inversely, indicating competition for food. If the increase in sockeye salmon abundance was associated with decreased smelt body size, it would indicate changes in the lake ecosystem. If this occurs, the AMP will need to consider whether hatchery operations should be modified. However, the longfin smelt population is apparently not a native one, or at least their presence was undetected until the mid-1900s, so changes in their abundance are not necessarily of great concern.

TABLE 2-23.
FACTORS THAT COULD CONTRIBUTE TO DECREASED ABUNDANCE OF LAKE WASHINGTON PLANKTIVORES (OTHER THAN SOCKEYE) AND POSSIBLE METHODS OF CORRECTION

Factor	Method of Correction
Reduced prey availability	The cause of the prey reduction would need to be determined. Increased competition with sockeye for food might be the cause. If so, is the effect substantial enough or of great enough concern to alter hatchery production? If so, then hatchery production should be decreased until a stable balance can be found between the number of sockeye and other lake planktivores.
Increase in predation rate	The cause of increased predation rates on salmonids would need to be determined. If it is a response to increased prey base, mainly through increased sockeye numbers, it would need to be determined if the effect was substantial enough to warrant modification of hatchery production.

SECTION 3.
ADAPTIVE MANAGEMENT SUMMARY

Table 3-1 presents the five major uncertainties, the proposed initial hypotheses to be tested, potential study outcomes for each hypothesis, and potential management responses to unfavorable outcomes. Proposed thresholds included in the discussion of hypotheses for each uncertainty in Section 2 will undergo further review by the Independent Science Advisors and Technical Working Group, and may change during the implementation of the AMP. Determination of threshold exceedence will be determined by the TWG and confirmed by the ISA, in cases where professional judgement is the primary basis for the decision.

Some of the ecological outcomes could be affected by multiple causes, including some that are independent of the hatchery program. Therefore, it is important to note that an assessment of cause will be conducted when a threshold is reached. This process is intended to determine, insofar as possible, the underlying cause or causes of the change. Using available data and professional judgment, the TWG and the ISA will be asked to assess the likelihood that the hatchery program is a significant contributor to the measured effect. If the experts believe that this is the case, then the TWG and ISA, if needed, would be asked for recommendations for a response.

They will first determine if one of the predefined responses in Table 3-1 would be an effective action. If so, they can recommend it to the AMWG and parties for implementation. If not, the TWG can recommend alternatives including no response, further study or other actions. In making recommendations, the TWG will consider the risk to the resource of exceeding the threshold and become more conservative when there is a high risk. Recommendations would be reviewed by the AMWG and the parties would make the decision regarding the appropriate response. The process for evaluating cause, making recommendations and making decisions will be open to the public.

TABLE 3-1.
SUMMARY OF AMP UNCERTAINTIES, HYPOTHESES, POTENTIAL RESEARCH OUTCOMES, AND MANAGEMENT ACTIONS

Hypothesis	Potential Outcomes	Potential Response Actions
Uncertainty No. 1—Are hatchery and naturally produced fry similar in size, growth, and migration timing, and at a stable population composition?		
There is no difference in migration timing between hatchery and naturally produced fry.	1. No significant difference 2. Significant difference*	• Study egg take timing versus river spawning timing and alter broodstock collection as necessary. • Study egg density and development rate relationships and alter incubation densities or temperature as necessary.
Hatchery and naturally produced fry are similar in size.	1. No size difference 2. Significant size difference*	• Alter broodstock spawning and collection to account for females of different sizes. • Adjust release strategy for fry. • Change incubation conditions. • Alter temperature of incubation water.
At the time of pre-smolt surveys, there is no significant difference in size of hatchery and naturally produced fry.	1. No significant difference 2. Significant size difference*	• Examine and alter, if necessary, the fitness level of hatchery fry. • Adjust release strategy • Adjust timing of hatchery fry to more closely resemble the natural fry.
At the time of pre-smolt surveys, the proportions of hatchery and natural sockeye are similar to those estimated upon entering the lake as fry.	1. No significant difference 2. Significantly greater* 3. Significantly less	• Evaluate relative trends in key life stages, including fry-to-adult survival rates, to help determine when in life cycle impacts are occurring. • See corrective measures under pre-smolt size and growth and fry size.

Note: Potential response actions only address the undesirable outcomes, which are followed by an asterisk in the potential outcomes column.

TABLE 3-1 (continued).
SUMMARY OF AMP UNCERTAINTIES, HYPOTHESES, POTENTIAL RESEARCH OUTCOMES, AND MANAGEMENT ACTIONS

Hypothesis	Potential Outcomes	Potential Response Actions
Uncertainty No. 2—Does the hatchery reduce the reproductive success of Cedar River Sockeye Salmon?		
The size and age composition of the population at maturity of Cedar River sockeye will not show a trend over time.	1. No trend 2. Trend to decreasing size and increasing age* 3. Trend to increasing size and decreasing age	• Adjust number of smaller individuals spawned. • Adjust fry production. • Assess smolt size • Adjust release strategy
The relationships between body size, fecundity and egg size of female sockeye in the Cedar River will remain within a normal range.	1. Constant relationship 2. Reduction in egg size and fecundity* 3. Increase in egg size and fecundity	• Adjust number of smaller females spawned. • Adjust fry production. • Ensure broodstock is representative of the run.
The spatial and temporal distribution of spawning will remain within a normal range over time.	1. No significant difference 2. Significant difference*	• Alter broodstock collection timing to represent the entire run. • Shift broodstock collection practices to remove fish from the entire run. • Assess hatchery practices for unforeseen effects.
There will be no difference in reproductive success between hatchery and naturally produced sockeye spawning naturally or a trend in overall reproductive fitness over time as a result of fish culture practices.	1 Similar rates and no trend 2. No similarity in rates and a decreasing trend* 3. No similarity in rates and an increasing trend	• Alter spawning methods at the hatchery to more closely follow natural conditions. • Allow a higher proportion of natural spawning.
The genetic composition of the Cedar River sockeye population will not change over time.	1. No change 2. Change*	• Re-examine trapping and spawning protocols at the hatchery and fishery management.

Note: Potential response actions only address the undesirable outcomes, which are followed by an asterisk in the potential outcomes column.

TABLE 3-1 (continued).
SUMMARY OF AMP UNCERTAINTIES, HYPOTHESES, POTENTIAL RESEARCH OUTCOMES, AND MANAGEMENT ACTIONS

Hypothesis	Potential Outcomes	Potential Response Actions
Uncertainty No. 3—Will the hatchery adversely affect sockeye populations outside the Cedar River?		
Sockeye harvest in Lake Washington does not capture unacceptable numbers of non-Cedar River sockeye.	1. No significant harvest 2. Significant harvest*	• Recommend study of timing and spatial distribution of various populations while in the lake and adjust harvest locations. • Make recommendations to co-managers regarding harvest management.
There is no significant amount of Cedar River hatchery sockeye straying into other Lake Washington basin creeks.	1. No significant straying 2. Significant straying*	• Release hatchery fry farther upstream to allow more time for imprinting. • Reduce hatchery fry production. • Make recommendations to co-managers regarding increasing escapement to other sites.
Uncertainty No. 4—Will the hatchery produce adverse changes in chinook salmon populations?		
Operation of the broodstock collection facility does not significantly delay chinook migration or alter spawning distribution.	1. No significant delay or change in spawning distribution 2. Significant delay and change in spawning distribution*	• Modify operational protocols at the collection facility • Modify facility design.
There is no significant damage to incubating chinook eggs from sockeye superimposition on chinook redds or reduction in chinook reproductive success.	1. No significant damage or reduced reproductive success 2. Significant damage and reduced reproductive success*	• Make recommendations to co-managers regarding lowering the escapement goal for sockeye. • Alter fry release strategy (spatial distribution).

Note: Potential response actions only address the undesirable outcomes, which are followed by an asterisk in the potential outcomes column.

TABLE 3-1 (continued).
SUMMARY OF AMP UNCERTAINTIES, HYPOTHESES, POTENTIAL RESEARCH OUTCOMES, AND MANAGEMENT ACTIONS

Hypothesis	Potential Outcomes	Potential Response Actions
Uncertainty No. 5—Will increased hatchery production alter aquatic community structure within the Lake Washington system?		
There is no relationship between sockeye abundance, growth and pre-smolt size in Lake Washington.	1. No relationship 2. Increased sockeye abundance and decreased growth and size* 3. Increased sockeye abundance and increased growth and size	• Examine temperature changes and effects to zooplankton. • Determine causal relationships. • Adjust hatchery production or release strategy if appropriate.
There is no relationship between sockeye abundance and the predation rates on salmonids in Lake Washington.	1. No relationship 2. Increased sockeye abundance and increased predation rate* 3. Increased sockeye abundance and decreased predation rate	• Determine causal relationships. • Adjust hatchery production if appropriate. • Adjust release strategy.
There is no relationship between sockeye abundance and the abundance of other planktivorous fish species.	1. No relationship 2. Increased sockeye abundance and decreased planktivore abundance* 3. Increased sockeye abundance and increased planktivore abundance	• Determine causal relationships. • Adjust hatchery production if there is a causal link with the hatchery and impacts are significant and adverse.

Note: Potential response actions only address the undesirable outcomes, which are followed by an asterisk in the potential outcomes column.

SECTION 4.
AMP MANAGEMENT

4.1 STRATEGY FOR SUCCESS

Section 2 of this document outlines a monitoring and research program considering the base of knowledge that exists and the major uncertainties thought to require careful future monitoring and evaluation. The technical program is expected to evolve each year based on its findings and information from ongoing efforts by the University of Washington, the Washington Department of Fish and Wildlife, the Muckleshoot Indian Tribe, and other investigators. Maximum benefit will be gained from the technical program by the following:

- Strategic use of monitoring resources so that the most important questions are addressed
- Having a well-managed and timely process to analyze the data and to store the results so that they are consistent, retrievable, and accessible to the public for scrutiny
- Establishing criteria for the statistical processes to be used with the various findings and thresholds of variation that can trigger modifications to hatchery operations
- Conducting an open, public process where technical recommendations are considered by the policy group and decisions made consistent with project objectives.
- Broad stakeholder involvement
- Involvement by credible and knowledgeable scientists
- Clear dispute resolution process
- Defined process for voicing minority opinion
- Emphasis on peer review in study plans, analysis and publication.

No matter how good the technical program is, a transparent, predictable and reliable process will be essential to convert the data into usable form and then into the appropriate operational decisions and actions.

There are many possible pitfalls at each step of the adaptive management process, including appropriate and adequate data collection, timely sample processing, analysis of study results, and adjustment of the hatchery program and AMP operations that incorporate the results of the study and its implications. The following steps are recommended to avoid these potential pitfalls:

- Sample and data analysis needs to be conducted in a timely manner. For example, large numbers of otoliths are currently collected in the field from adult and juvenile sockeye salmon. Experience indicates that considerable delay may occur between sample processing and the availability of the data. In order to make informed management decisions, study results must be made available to managers within an acceptable time period. It is expected

that project results, along with all study data, be made available within one year of data collection completion.

- The diverse data being collected by multiple investigators needs to be maintained in a database that is well organized and publicly available. Data compilation and management is an essential component of any large investigation. Archived data should include not only the primary data collected (such as redd counts), but the associated metadata as well. Metadata includes such things as the documentation of the study design: objectives, measurement methods, sampling design, and association of each primary data measurement with a time and place. The completeness and adequacy of the metadata are judged relative to the uses that might be contemplated for the analysis and interpretation of the primary data. Ancillary information that is necessary for re-analysis and interpretation of data is "necessary" metadata.
- Effective communication of the scientific findings to decision-makers will depend on having a designated scientific coordinator who will work with the technical work group to integrate and interpret research results and help the managers to translate results into the appropriate decisions (see Section 4.5 for a further discussion of this).

To ensure that program objectives are met, working group participants must act decisively on a scheduled basis to:

- Evaluate the data.
- Make information available to the public.
- Formulate any recommendations to modify hatchery operations.
- Consider and deliberate on these recommendations in a public forum.
- Adopt the changes necessary to meet program objectives.
- Implement those changes in the next cycle of operations.
- Monitor the results of the implemented actions to ensure that anticipated objectives are achieved.
- Periodically review monitoring program and adjust as necessary to address key issues

A proven model for successful adaptive management is for individuals with knowledge and commitment to the success of a program to work together in an open, transparent, agreed-upon structure. It has been shown in other communities that adaptive management of complex and controversial projects can be successful if the parties work together and reach agreement on support of management decisions. The management decisions need to be developed in a public process that has the benefit of comprehensive technical information and input from interested parties.

The evolution of fisheries science and management in the Pacific Northwest is rich in lessons learned from research and extensive fish culture and habitat management programs that have had varying degrees of success. The Pacific Northwest is home to many

of the world's leading experts in cold-water ecology, fish culture and fisheries management. The extent of the Cedar River Sockeye Hatchery's success will depend, in part, on the ability to enlist the proper expertise to deal with each major technical and management issue that arises.

Successful implementation will require commitment by those involved to initiate, maintain and evolve activities that serve the program's needs. In order to meet the proposed schedule for operating the hatchery in brood year 2007, the adaptive management process must be advanced soon enough to support the operating plan for that year. Suggested implementation steps are:

- Approve the Adaptive Management Plan in 2005 by the LMA parties
- Select a steering committee (by the LMA parties) to manage the AMP startup
- Select a steering committee chairman (by the LMA parties) who would later become operations manager for the Adaptive Management Work Group
- Develop a work plan that will ensure that necessary elements of the AMP, Hatchery Program Management and Annual Operating Plan are in place in time for the first year of operations. See Section 4.5 below for a proposed Implementation Schedule.

4.2 RELEVANT ORGANIZATIONS, COMMITTEES AND PANELS

4.2.1 City of Seattle

The City of Seattle has overall responsibility for implementing the HCP and is one of four parties to the LMA. It is responsible for management of impoundments and diversions of the Cedar River at Landsburg and upstream and for fisheries mitigation as defined in the HCP and LMA.

4.2.2 Washington Department of Fish & Wildlife

The Washington Department of Fish and Wildlife has responsibility for co-management of salmon runs in the Lake Washington Basin under provisions of federal court decisions. It has overall responsibility to preserve, protect and perpetuate the state's fish and wildlife. Within this broader duty of stewardship, the WDFW is to maximize fishing, hunting and outdoor recreational opportunities and to seek to maintain the economic well being and stability of the fisheries industry in Washington. The agency's authorities include establishing and enforcing regulations for time, place and manner of taking the state's component of harvestable salmon and for permitting and regulating in-stream activities.

4.2.3 Muckleshoot Tribe

The Muckleshoot tribe, together with the Suquamish and Tulalip tribes, has responsibility for co-management of salmon runs returning to the Lake Washington Basin under provisions of federal court decisions. These tribes' authorities include establishing and enforcing regulations for time, place and manner of taking their component of the harvestable quota of salmon.

4.2.4 National Marine Fisheries Service

The National Marine Fisheries Service is responsible for the listing and protection of Pacific salmon species at risk under provisions of the Endangered Species Act. Its authorities include review and approval of state plans for recovery of listed species and "taking" under Sections 7 and 10 of the ESA.

4.2.5 U.S. Fish and Wildlife Service

The U.S. Fish and Wildlife Service is responsible for listing and protection of most fresh water fishes, including salmonids, other than salmon that are at risk under provision of the Endangered Species Act. Its authorities include review and approval of state plans for recovery of listed species and actions involving "take" under Sections 7 and 10 of the ESA.

4.2.6 King County

King County is responsible for the protection of water quality and streamside riparian corridors under the provisions of the State Environmental Protection Act and the Shorelines Management Act. Its authorities include issuance of all building permits and special permits for any construction in sensitive areas and within shoreline zones in unincorporated regions of King County.

4.2.7 City of Renton

The City of Renton is responsible for protection of water quality and streamside riparian corridors under the provisions of the State Environmental Protection Act and the Shorelines Management Act. Its authorities include issuance of all building permits and special permits for any construction in sensitive areas and within shoreline zones within Renton City limits.

4.2.8 U.S. Army Corps of Engineers

The Army Corps of Engineers is responsible for regulating construction activities in wetlands and navigable waters under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act of 1899. Its authorities include issuance of permits for construction in wetlands and within navigable waters.

4.2.9 The Cedar River Anadromous Fish Committee

The Cedar River Anadromous Fish Committee was established by the LMA and serves as an advisory group to the four parties to the agreement. This group has met monthly to review and discuss issues related to fisheries mitigation activities on the Cedar River. The AFC membership presently includes representatives from the following:

- The City of Seattle
- King County
- The Muckleshoot Tribe
- Washington Department of Fish & Wildlife

- National Marine Fisheries Service
- U.S. Fish and Wildlife
- Puget Sound Anglers
- Washington Trout
- Trout Unlimited
- Long Live the Kings
- Public at large.

4.2.10 The Science Panel

The science panel was assembled in early 2000 by invitation from the City of Seattle. Experts in sockeye biology, Lake Washington ecology, fish diseases, genetics and recent hatchery reform initiatives joined this panel from the University of Idaho, University of Washington, U.S. Fish and Wildlife Service, National Marine Fisheries Service and U.S. Geological Survey. They have provided guidance for the development of operating protocols and the monitoring program of the Cedar River Sockeye Hatchery.

4.3 MANAGEMENT PRINCIPLES

The following principles guide the design of the AMP organization and process:

- Monitoring and research programs need to be designed in response to the needs of management entities by scientists with qualifications and experience relevant to the Cedar River system issues.
- The design and results of monitoring and research programs should be independently reviewed by qualified peers.
- A workable process is required to communicate management needs to researchers, to develop recommendations based upon technical findings and to make and implement the appropriate decisions.
- A public forum is required for transfer of technical results to the management entities and to seek consensus on management response to technical findings.
- Interested parties should be provided access to available information as well as to the process for full and timely participation in proposals and recommendations.
- Consensus will be sought as biological results are evaluated and operating decisions are made.

4.4 AMP PARTICIPANT RELATIONSHIPS

One of the most important elements for a successful AM program is an appropriate management structure to implement the AM process correctly. Gold (2004) cited the following principles that should be considered in establishing a management structure.

- Maximize the collaborative process and public participation

- Provide parity between the needs of managers for information to support decision-making and the need for scientists to do the required monitoring and research
- Balancing the need for relevance with the need for quality and objectivity
- Having measurable goals and objectives
- Embracing uncertainty.

Figure 4-1 shows the proposed participants and their relationships for implementation and evolution of the AMP. Other participants in the process are the independent scientists, the researchers, the Technical Work Group and hatchery management. The primary path of communications runs between the Technical Work Group (TWG), the AMWG and the parties to the LMA. The public at large will have access to the information generated by the project as well as be able to participate in the decision-making process. This process is intended to be transparent in order to both serve the public's interest and provide the opportunity for productive input into management decisions.

4.4.1 Parties to the Landsburg Mitigation Agreement

The LMA states: "The Parties are committed to use adaptive management to address critical questions as they arise, and make changes in management based on the results of monitoring to meet the specific objectives of the program." In addition, the LMA states: "Except as otherwise provided, changes in all major aspects of study planning, implementation, and coordination with other related studies shall, within the indicated cost constraints, be subject to the approval of the Parties, in consultation with the [AFC] Committee,…". To be consistent with the LMA, the parties to the LMA will form the decision-making body that receives information and recommendations primarily through the AMWG. Party meetings will be open to the public and held as needed.

4.4.2 Adaptive Management Work Group

The AMWG, composed of agencies and stakeholders with an interest in the Cedar River Sockeye Hatchery Program, formulates recommendations to the parties. Under the LMA, the Cedar River AFC is designated to fulfill the role of the AMWG in providing advice to the parties on the operations and evaluation of the sockeye hatchery. Before the AMWG is formed, the parties will evaluate whether or not there is a need for change to the AFC to fulfill the role of the AMWG. This evaluation will include both the composition of the AFC and the ability of the AMWG to meet its goal of being representational, and discussion with the represented organizations to consider whether changes in individual representatives are needed to seat people best suited to the specific work of the AMWG. The SPU delegate will serve as chairperson and operations manager for the AMWG.

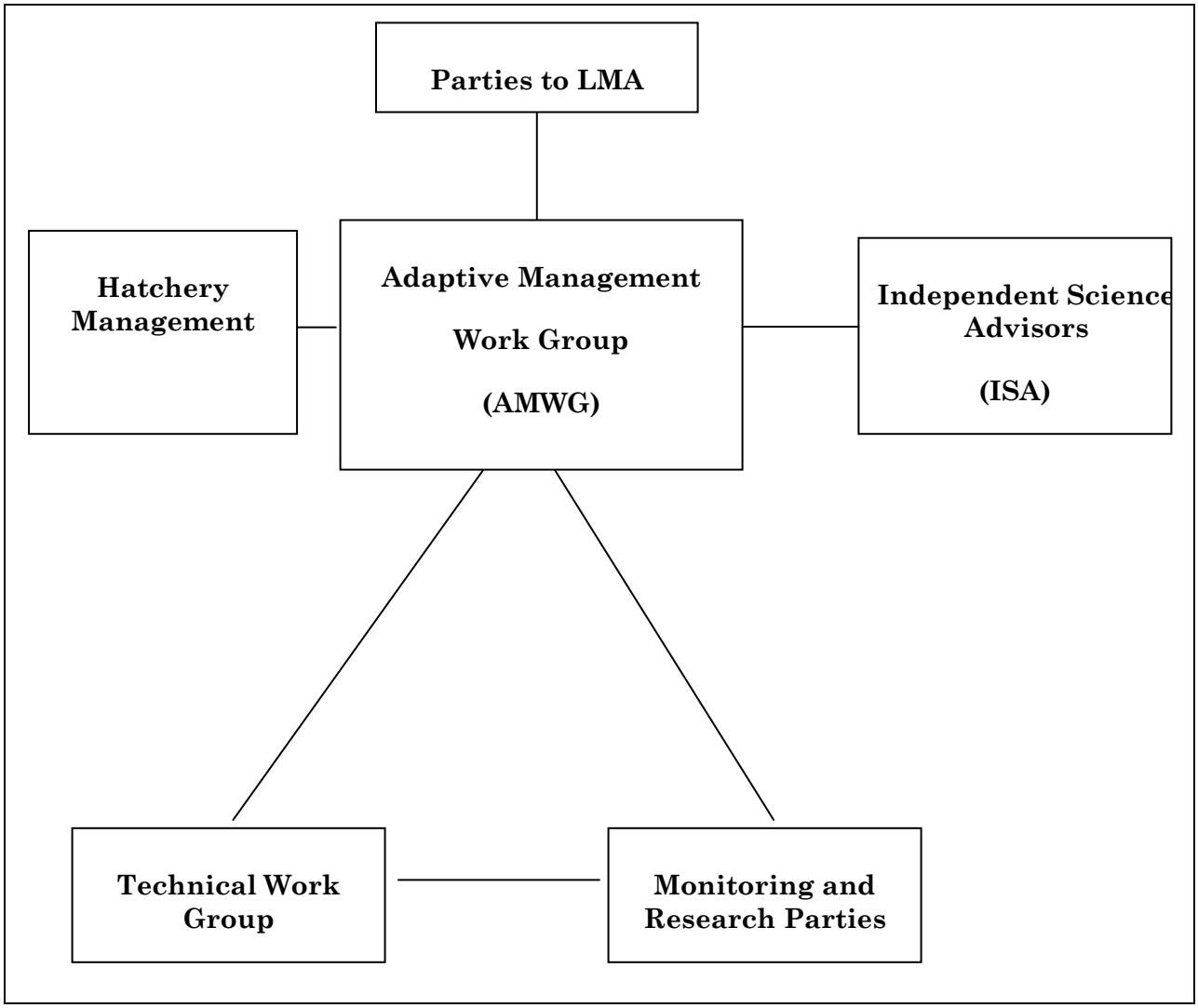

Figure 4-1. Proposed AMP Participant Relationships

The AMWG will be responsible for making recommendations to the parties regarding:

- The framework and detail for AMP policy, goals and direction.
- Membership of the Technical Work Group and the Independent Scientific Advisors.
- Multiple-year budgets and annual operation plans within the context of a long-term (five-year) strategic plan.
- Final review and approval of all science and management activities.
- Establishment of priorities for program implementation
- Adoption of a set of thresholds for each hypothesis in the AMP that will trigger the evaluation and decision-making process. A key component of the thresholds is the level of statistical certainty the monitoring program

should be designed to achieve. The process of evaluating thresholds and for responding to threshold levels will encourage public involvement.

- Adoption of the annual report on current and projected year operations as described in the Operating Protocols.
- Oversight for hatchery operations for compliance with the operating plan with input from the technical work group, other scientific advisors and the public.

In addition, the AMWG will be responsible for the following:

- Assembly and distribution of relevant technical information that comes available in between annual report cycles
- Solicitation and coordination of input from all interested parties.

The AMWG will meet at least annually or as necessary to discuss reports from the Technical Work Group, hatchery managers and others concerning the hatchery program and its effects. These meetings will be public meetings to discuss hatchery activities and findings from the monitoring and research efforts. Meeting topics will generally be scheduled in advance, with agendas issued to the public two weeks in advance of the meetings.

Meetings will be conducted as working sessions where each topic is presented to the attendees by the operations manager or designee, with technical support coming from the ISA or the TWG, as needed. Initial discussions between all members of the AMWG will be conducted to clarify the details and for members to express opinions. This will be followed by any input from the public, and then by debate and the formation of any recommendations to the parties. If there is not consensus with the AMWG on a recommendation, then those holding the minority view shall be given the opportunity to prepare a written statement describing the justification for their position and this statement will be conveyed to the parties for consideration along with the majority's recommendation.

The AMWG operations manager will be responsible for maintaining regular communications with the co-managers, particularly with regard to run-size predictions and harvest management planning and regulating. The operations manager will also maintain regular contact with the parties, ISA, TWG and Hatchery Manager.

4.4.3 Technical Work Group

The TWG will be responsible for the use of sound science in the evaluation of the hatchery. This group will include at least a minimum of five experts in the following areas: pathology, genetics, Lake Washington ecology, sockeye salmon biology and hatchery reform/operations. In addition to these five positions, it is recommended that two other at large positions be available if needed to provide for either appointment of a generalist or for other technical specialists that are identified. These appointees will be selected by the parties to the LMA in consultation with the AMWG. The TWG will elect a chair from its members. The City of Seattle will provide or arrange for technical support in the area of sampling design and statistical analysis, as needed.

It is proposed that the membership of the TWG be recruited from federal and state agencies, tribal organizations, universities, or private practice based primarily on the technical expertise needed and the commitment of candidates to sound resource stewardship. In addition to technical capability, potential members will be evaluated on their ability to work as part of a group and on their interest and ability to clearly communicate scientific information to managers and decision-makers. Members will be appointed on staggered terms. Candidates will not be chosen on the basis of representation of specific organizations or agencies.

Operating guidelines for the TWG will be approved by the parties before the TWG begins its work. The TWG will be responsible for the following:

- Reviewing and recommending the criteria and thresholds that would indicate the point at which either changes should be made to the hatchery program or formal evaluation should occur, as appropriate.
- Drafting monitoring and research objectives, protocols and plans.
- Developing and review budgets and RFPs for monitoring work.
- Reviewing monitoring and research reports.
- Overseeing data management and analysis.
- Evaluating the effects of management actions.
- Recommending the appropriate changes to hatchery operation when trigger points are reached.
- Recommending appropriate changes to the criteria and thresholds when appropriate.
- Recommending changes to the Annual Operating Plan.
- Providing technical review of the Annual Report on hatchery operations.

The TWG will meet on a quarterly schedule, or as necessary, to review new information that is accumulating from hatchery operations and the monitoring and research activities, to conduct the business of the group to fulfill its responsibilities, and to finalize recommendations to the AMWG. These meetings will be open to the public.

A scientific coordinator will be selected by the parties to lead the TWG. The coordinator will chair meetings, plan the work of the TWG and represent the TWG before other committees and the parties. The scientific coordinator will be responsible for maintaining open communication links with the parties, the AMWG, hatchery management and the Independent Scientific Advisors. The TWG will provide advice as needed to ensure that the monitoring and research objectives are relevant, realistic and scientifically credible.

4.4.4 Independent Science Advisors

The Independent Science Advisors will serve as a review and recommending body of the AMWG and as an advisory body for the TWG and will make recommendations to resolve conflicts regarding technical, research, and management approaches. Advisors will be expected to provide independent assessments of monitoring data to determine if thresholds

are exceeded, in cases where professional judgement is used as the primary basis for the decision. This group will be asked to do periodic program reviews. The results of any ISA review or any ISA recommendations will be given directly to the AMWG, TWG and the parties, with copies available to the public upon request.

A list of Independent Scientific Advisors will be developed that includes specialists in the Northwest, not serving on the TWG, who have the qualifications needed to review scientific and technical aspects of the AMP activities. Individuals such as college professors and scientists associated with state, federal or tribal organizations or in private practice are anticipated to form the pool of talent from which to recruit. Nominations for appointment to this group will be solicited from the stakeholder groups and public at large. The parties will select the names of the advisors, after soliciting advice from the AMWG.

4.4.5 Hatchery Management

Hatchery management will be responsible for implementing the decisions of the parties regarding hatchery management operations and for operating the hatchery in an effective and efficient manner. Hatchery management will be overseen by the parties and will interact with the AMWG and the TWG. This group has the following authorities:

- Implementation of technical, science, management or other activities approved and assigned by the parties in consultation with the AMWG
- Implementation of activities under its own authority, e.g., cost-saving management functions; improvement activities in technical/ management areas
- Make recommendations to changes in operations and policy management actions to the AMWG

4.4.6 Public Involvement

Public involvement plays a critical role in providing extended review of scientific findings and of recommendations made by the AMWG to the parties. Public involvement will be integrated throughout the AMP by providing access to information and recommendations, by providing opportunity to listen to committee deliberations and by providing opportunity to comment to committees.

4.5 AMP IMPLEMENTATION

Successful adaptive management is elusive. It is natural to get comfortable with routine and to resist change. Additionally, different pressures will come from various stakeholders to manage the hatchery to best suit their particular interests. It is essential that the policy/decision makers implement a rigorous program to start and evolve an AMP process that will achieve the stated goals and to do so in a manner that instills confidence in all stakeholders and the public at large that hatchery operations are conducted and modified based on the best scientific information available. Table 4-1 provides a proposed series of the major steps foreseen to get the AMP up and running in concert with the start up of first year hatchery operations.

TABLE 4-1.
ADAPTIVE MANAGEMENT PLAN IMPLEMENTATION

Activity	Date
Final drafts of Adaptive Management Plan (AMP), Capacity Analysis, and Operating Protocols Submitted to Anadromous Fish Committee for recommendation	March 2006
Parties to the Landsburg Mitigation Agreement Concurrence	June 2006
Parties to the Landsburg Mitigation Agreement approve membership and operating guidelines for Technical Working Group (TWG) and Adaptive Management Work Group (AMWG)	June 2006
Monitoring and Research Parties (MRP)/ TWG / ISA/ AMWG review Adaptive Management Plan and Operating Protocols and refine / modify criteria and thresholds.	July 2006- January 2007
Development of data management and monitoring protocols (TWG, ISA, AMWG, Parties)	January 2007
Establish Data Management System	March 2007
TWG reviews annual report on hatchery program and provides comments to AMWG	Annually beginning in 2007
TWG recommends priorities for Adaptive Management by reviewing existing uncertainties and hypotheses and adjusting as needed to provide direction for the monitoring program.	Annually beginning in 2007
TWG reviews and recommends modifications, if needed, to criteria, thresholds, and responses	Annually beginning in 2007
Annual operating plan submitted by TWG to AMWG for review and Party approval	Annually beginning in 2007
Review monitoring protocols	Every 5 years

4.6 DATA ACQUISITION AND MANAGEMENT SYSTEM

The development of a system to ensure that the appropriate information is collected, reviewed and stored is crucial to enabling the objective evaluation of the program. The data management system will include procedures for the acquisition, transfer, QA/QC, archival and access to data. Standards will be developed for metadata and data storage. This work will be done during the year before the hatchery begins operation.

4.7 DISPUTE RESOLUTION PROCESS

The goal of the adaptive management committees will be to reach consensus in recommendations and decisions. When this is not possible at the committee level, provisions for the expression of minority opinions will be made so that decision-makers and the public are informed of the diversity of views. When the parties disagree, the dispute resolution process will follow that described in the LMA.

4.8 PROCESS FOR RESPONDING WHEN THRESHOLDS ARE EXCEEDED

The Adaptive Management Plan establishes thresholds (Section 2) that are used to define in advance what would constitute unusual and undesirable outcomes associated with key uncertainties. These thresholds are defined for each set of hypotheses and are intended to be reviewed during the period prior to implementation and periodically thereafter as information is gathered to ensure that they are set appropriately. Where feasible to do so, statistical testing will be used to determine if thresholds have been exceeded. In other cases, experts will be asked to use statistical and quantitative analyses to aid their determination of whether results are significant. In the latter situation, both the TWG and the ISA would be asked to provide their independent assessments of the data to the Parties. If the Parties conclude that a threshold has been exceeded, the parties will ask the TWG to determine the cause. The TWG would be expected to consult with any of the researchers involved and may consult with Independent Scientists as well. The Parties may decide to ask for an independent assessment of cause by independent scientists. The TWG and the independent scientists (when involved) will provide their findings to the AMWG, along with any actions that they recommend be taken. The AMWG will consider the TWG findings and recommendations, along with any from independent scientists, and develop their recommendation for consideration to the parties. The parties will meet to review reports, hear from the public and decide how to respond to the recommendations. If the parties do not accept the recommendations of the AMWG, the parties must provide reasons for doing so and these shall be provided to the public and committees upon request. If response actions are required, monitoring will continue to determine whether the response action has been successful in reducing the effect so that it drops below the threshold level. If the response action is unsuccessful, further analysis would lead to consideration of alternatives. Thus, the adaptive management process is a cycle involving monitoring, evaluation, adjustments to operations, when necessary, and continued monitoring and evaluation (see Fig. 1-1). For further information see Section 2 and 3.

4.9 SUMMARY

The long-term success of the Cedar River Sockeye Salmon Hatchery hinges upon effective cooperation and coordination between the involved agencies, the Muckleshoot Tribe, the stakeholders, the public and the scientific community. This hatchery is very significant because of its visibility, history, and potential benefit. An extraordinary level of effort is being invested in implementing this sockeye mitigation project in a manner that is compatible with natural systems. There is a risk that complicated procedures could result in excessive costs and reduced benefits. To optimize the scientific and other community benefits, it is incumbent upon all participants to streamline and simplify where possible while striving to meet project objectives.

The Adaptive Management Plan and the other program documents are proposed to become the basis for the Annual Operating Plan for the first year of operations and for the management structure that will be necessary for implementation of a successful Adaptive Management process. Discussions and negotiations between the participants will be needed to finalize the roles and responsibilities of each participant and to select the proper team. Membership in the technical groups and hatchery management should always be based upon technical expertise and professionalism, not on affiliation. Early initiation of

discussions between the parties and their advisors should lead to an effective startup and hopefully good operating efficiency and more healthy fish in the Lake Washington system.

SECTION 5.
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Cedar River Sockeye Hatchery Program Adaptive Management Plan: Adaptive Management Work Group Charter and Operating Guidelines

Preamble

Multiple reasons exist for preparing a work group charter. One is to document the work group's purpose and to clearly define individual and group roles, responsibilities, and operating rules. Next, it establishes procedures for both the work group and agency staff on communicating, reporting, and decision-making procedures. It lays out a blueprint for conducting business for the programmatic objectives, and defines how the team works in an empowered manner, including setting out responsibility and authority. Finally, it facilitates stakeholder buy-in by including key members in the decision making process.

Because there are a wide variety of work groups, group sizes, and organizational protocols, no two charters will ever be identical. That affords members a great deal of latitude in determining what information should or should not be incorporated into the charter. The key in evaluating charter content is to ask the question: "Will this information potentially minimize conflict or confusion later in the project?" If the answer is "yes," then that component of the work group charter should be incorporated.

Work group charters formalize information that is frequently given as "understood" among members. As such, some members (particularly those with years of service in an organization) may balk at the notion that they should document how their relationship with their peers should function. Also, work group charters generally have little or no enforcement capability associated with them. The success of this charter is reflected in the successful operation of the hatchery. Ultimately, that is more important than the group itself. The charter frequently hinges on work group members' capacity to police themselves and adhere to the spirit if not the letter of the operating guidelines. If they can capably encourage others to follow the guidance of the work group charter, it becomes more effective over time.

1. Introduction

a. Background and context

- The Adaptive Management Plan (AMP) defines an operating and management framework for the Cedar River Replacement Sockeye Hatchery Program ("the Hatchery") as a legal component of the Landsburg Mitigation Agreement (as further described in section 2.b.iv.3). The Adaptive Management Work Group (AMWG) and the Technical Work Group (TWG) are specified in the AMP as the body of stakeholders responsible for overseeing research and monitoring under the Adaptive Management Plan on behalf of the Cedar River Sockeye Salmon Hatchery (see section 2.b.i details about governance structure of the

AMWG, and see section 2.b.iv(1) regarding the TWG). The AMWG is composed of agency representatives and stakeholders with an interest in the Cedar River Sockeye Hatchery Program, and formulates recommendations to the Landsburg Mitigation Parties regarding operation of the hatchery. The TWG is composed of up to seven technical experts with scientific focus on different aspects of salmon ecology, biology, and production science. The AMP provides direction for exploring and resolving "key scientific uncertainties" related to the effects of operating the Hatchery in order to achieve the Vision as stated immediately below. The AMP was completed in 2006 and will be critically reviewed and updated to reflect any significant developments or needed changes since then..

b. Vision
   i. The AMWG uses a sustainable adaptive management approach to meet these goals:
      - Implement the Cedar HCP and Landsburg Mitigation Agreement commitments related to a biologically and environmentally sound long-term sockeye hatchery program that will help to provide for the sustainability of a well-adapted, genetically diverse, healthy, harvestable population of Cedar River sockeye.
      - Avoid or reduce detrimental effects on the fitness and diversity of naturally reproducing salmon populations in the Cedar River and the Lake Washington basin.
      - Augment fry production from natural sockeye spawning in the Cedar River to produce a larger and more consistent number of returning adult sockeye, such that more frequent and more robust tribal and sport harvest fisheries should result.

c. Purpose
   - The central purpose of the AMWG is to direct the collection of information and to guide the use of that information to make ongoing recommendations to the LMA Parties for hatchery operations (including but not limited to: establishment of egg-take goals and hatchery production plans, broodstock collection, spawning and incubation of eggs, rearing and marking of hatchery fry, release of hatchery fry into the natural environment, and monitoring, evaluation, and documentation of hatchery activities) to best achieve the objectives of the AMP.

d. Objectives
   - Use research, monitoring, and analysis to improve the effectiveness of Hatchery operations.
   - Provide oversight by tribal government, relevant agencies, and stakeholders in the operation of the Hatchery.

2. <u>Governance</u>

a. Organizational Hierarchy (see also attached "Governance Structure" diagram)
   - The Adaptive Management Work Group is charged with directing the scientific research and monitoring process for providing recommendations for improved hatchery operations

to the LMA Parties over time. This includes providing direction for collection and use of information by the Technical Work Group to address the key uncertainties in the AMP, and other issues as deemed appropriate by the AMWG. The AMWG will direct the activities of the TWG in consultation with other parties involved in conducting the research, and with peer review input from the Independent Science Advisors (ISA) [see section b.iv(2)]. The AMWG, in consultation with the TWG, will then provide reports and recommendations for operational hatchery changes and /or other relevant and related activities as appropriate, to the LMA Parties [see section b.iv(3)] for approval as needed.

b. Role and responsibilities
   i. Role and responsibility of Adaptive Management Work Group
      (1) The AMWG guides the implementation of the AMP. It's primary role is to direct the use of science to address uncertainties associated with the operation of the Hatchery—especially the five key uncertainties identified in the AMP—and to use lessons learned to make recommendations for changes to hatchery operations that are consistent with the above stated vision. All recommendations for actions to be taken by the LMA Parties with regards to operation of the Hatchery are made by the AMWG.

      (2) The AMWG will be responsible for making recommendations to the LMA Parties regarding:
         - The framework and detail for AMP policy, goals, direction and specific actions.
         - Membership of the TWG and ISA
         - Multiple-year budgets and annual operation plans within the context of a long-term (five-year) strategic plan.
         - Final review and approval of all science and management activities related to hatchery operation.
         - Establishment of priorities for program implementation.
         - Adoption of a set of thresholds for each hypothesis in the AMP that will trigger the evaluation and decision –making process.
         - In conjunction with the TWG collect and utilize current existing information to evaluate the currency of key uncertainties in the AMP..
         - Adoption of the annual report on current and projected year operations described in the "Operation Protocols".
         - Oversight for hatchery operations for compliance with the operating plan with input from the TWG, the ISA, and the public.
         - Assembly and distribution of relevant technical information that becomes available in between annual report cycles.
         - Solicitation and coordination of input from all interested parties.

(3) The AMWG has the above responsibilities as a function of its support to the LMA Parties. The LMA Parties have exclusive authority over what recommendations to partially or fully adopt or reject. In addition, the LMA Parties may make requests of the AMWG for technical inquiry and the AMWG will respond timely to any such requests with recommendations, information, or TWG scientific requests, and will timely inform the TWG of all such requests.

(4) AMWG and LMA Parties' approval will be required before the TWG begins implementing specific research or monitoring recommendations it provides to the AMWG. The TWG may formally recommend consideration of an issue or proposal by the AMWG at any time, and the AMWG will provide prompt communication regarding the request.

(5) In the course of implementing the AMP, the AMWG may wish to further discuss technical issues with the TWG or vice versa, and either work group may request a joint meeting of the AMWG and TWG to discuss and resolve technical and/or operational issues at any time.

(6) The AMWG may find that there are issues or opportunities that would be well-served by the formation of a sub work group. The AMWG may form ad-hoc sub-groups as deems appropriate for the success of the AMP.

ii. Role and authority of the AMWG Chair

(1) The SPU representative to the AMWG is to act as its Chair. The Chair has the primary duty of calling all meetings to order and officially presiding over the Work Group meetings. This includes: preparation and dissemination of the agenda at least five days in advance, recognition and assignment of official action items, and the review of past action items at each meeting. The Chair has a single equal vote on all issues officially considered by the AMWG.

(2) The AMWG Chair and the Scientific Coordinator [see section b.2.iv(1) below] will serve as the primary contacts for communications occurring between the two work groups as further described in the "Communications" section 3 below.

(3) The AMWG Chair will also serve as the "Operations Manager" for the AMWG regarding all hatchery issues. The Operations Manager will be responsible for maintaining regular communications with the co-managers, particularly with regard to run-size predictions and harvest management planning and regulating functions of the co-managers. The Operations Manager will also maintain regular contact with the LMA Parties, the TWG, the ISA, and the Hatchery Manager.

iii. Role and responsibility of SPU AMP lead staff

- The AMP lead staff is assigned to facilitate the success of the AMP process. This includes coordination with and among the groups involved in the AMP process and with individual members of the groups and their respective agencies. The AMP lead staff does not have a vote in any official decisions made by the AMWG, but will often participate in deliberations by the work groups. The AMP lead staff will conduct programmatic duties as requested by the AMWG, the TWG, and SPU in support of the AMP process.

iv. Roles and responsibility of other organizations/workgroups

(1) Technical Work Group:

- The Technical Work Group's role is to: 1.) provide the AMWG with recommendations for prioritization of data needs and to oversee monitoring, scientific data collection, information storage and access, and research requested by the AMWG to inform the best operation of the hatchery; and 2.) evaluate the information generated through monitoring and research, and use that information to make recommendations regarding the operation of the hatchery . The TWG provides the technical work needed to resolve the key uncertainties in the AMP and other possible relevant issues for implementation of improvements to hatchery operations. The TWG elects among its members a "Scientific Coordinator" to serve as the chair of the work group.

(2) Independent Science Advisors (ISA)

- The ISA is a group of independent peer reviewers who may provide review and comment on studies and recommendations from the TWG, and may assist the AMWG and the TWG in evaluation of information and recommendations from the TWG. The ISA is intended to provide a roster of scientists reflecting a range of specialized technical expertise, which may be sought to provide further guidance or input on topics or recommendations considered by. The AMWG envisions consulting experts from the ISA infrequently in cases where specific technical perspectives may be desired. Formal AMWG approval will be required for any expenditure of AMP funds on ISA-related activities.

(3) LMA Parties

- The legal oversight of all management activities related to the Cedar Sockeye Hatchery is provided by the LMA Parties according to the terms of the Landsburg Mitigation Agreement and also by the Muckleshoot Indian Tribe Settlement Agreement. The LMA Parties referred to here, and for the purposes of the AMP and the AMWG include: City of Seattle, U.S. Fish and Wildlife Service, NOAA Fisheries Service, the Washington Department of Fish and Wildlife, and the

Muckleshoot Indian Tribe (by the powers provided in the MIT Settlement Agreement).

(4) Anadromous Fish Committee (AFC)

- The AFC is an advisory group formed in the LMA to support the implementation and oversight of the LMA. The AFC remains an extant committee concurrent to the AMWG, and has ongoing responsibility related to anadromous fish issues outside of the Hatchery or the AMP (primarily related to the protection and management of species other than sockeye, including passage of fish at Landsburg Dam, habitat considerations in the Cedar River, et cetera).

(5) Hatchery Manager

- The Hatchery is to be operated by the Washington Department of Fish and Wildlife under contract with Seattle Public Utilities. A copy of that contract, including annual implementing documents, will be accessible to the AMWG, as requested.

c. Membership

i. The AMWG membership is as specified for the AFC in section F.1 of the LMA. The composition of the AMWG is:

(1) Seattle Public Utilities (Chair)
(2) U.S. Fish and Wildlife Service
(3) NOAA Fisheries Service
(4) Washington Department of Fish and Wildlife
(5) Muckleshoot Indian Tribe
(6) King County Department of Natural Resources and Parks
(7) At-large Public Interest Stakeholder Member: Washington Trout
(8) At-large Public Interest Stakeholder Member: Puget Sound Anglers
(9) At-large Public Interest Stakeholder Member: Frank Urabeck (Public)
(10) At-large Public Interest Stakeholder Member: Bill Robinson (Public)

ii. Members serve voluntarily on the AMWG and are paid by their primary employer (if at all) for the duties provided to the AMWG. The AMWG only assigns representation to individuals who serve as at-large public interest members. Agencies/organizations hold membership as constituent member organizations, regardless of which individuals serve as their staff on Work Group.

iii. Appointed Stakeholder Members shall serve for five-year terms, effective from the date of selection by the Parties (deemed to be October 1, 2010 for the inaugural AMWG). Stakeholder Members may serve multiple terms. There are no terms or limits of membership duration for the other agency members of the AMWG.

iv. There are no provisions for proxy or alternate attendance. However, agency membership is by agency and not personnel, and therefore more than one staff member may represent the agency and may cast a single vote on behalf of that member agency. Member organizations will be responsible for determining who should attend meetings of the AMWG and whether that person is authorized to formally represent (i.e. vote) the organization in the meeting.

d. Meetings

i. The AMWG will meet at least quarterly or more frequently as approved by the Chair and AMWG. These meetings are to discuss hatchery operational activities and issues related to using scientific investigation and adaptive management to operate the hatchery. Meetings will be open to public attendance.

ii. A draft agenda and work products prepared by the Chair will be sent to the AMWG members at least one week prior to any regular meeting. All Work Group meeting agendas shall be approved by the AMWG at the beginning of each meeting, and shall include a prescribed time as a separate agenda item during which members of the public may share their ideas, comments, and views on AMWG activities. The Chair may limit the amount of time allotted to the public to address the AMWG. Items may be added to the current agenda during the course of a given meeting by majority vote of the Members; however, no action may be taken on such items at that meeting.

iii. Meetings will be conducted as working sessions where each topic is presented to the attending members by the AMWG Chair, the AMP lead staff, the Scientific Coordinator, and/or Scientific Coordinator's designee, with technical support from the others as necessary.

iv. The AMWG will participate with the TWG in a regular joint scientific review session that will be open to the public, for review and discussion of the status of the research and monitoring activities of the AMP.

v. The AMWG Chair will be responsible for providing staff for the purpose of keeping minutes of each meeting of the Work Group. Minutes include a summary of each agenda item discussed, which captures the context and the intent of the AMWG. Minutes will also serve as a record of all actions taken by the AMWG. Minutes will document key arguments made for and against actions of the Work Group.

e. Decision making

i. Discussions between AMWG members and any other consulted parties will be held to clarify details and understandings in the process of developing recommendations for the LMA Parties. This will be followed by a reasonable opportunity for input from the public , and then by debate and the formation of recommendations to the LMA Parties.

ii. All AMWG recommendations will be transmitted directly to the LMA Parties for approval.

iii. The AMWG will make determined efforts to make all formal work group decisions regarding study recommendations, hatchery management, or other technical issues, by full consensus of all the members. Should there be no clear consensus for a recommendation to the LMA Parties, despite extensive group deliberation, the AMWG may hold a majority vote at the discretion of the Chair. Any member of the AMWG may independently move for a vote on a recommendation, which may be held if seconded by another member. All formal votes will be decided by a simple majority of a quorum of members.

iv. The AMWG shall be considered to have a quorum of members present when at least six members are present, and must include both the MIT and WDFW members. Members may participate by telephone or video conference as necessary.

v. In the event of a non-consensus, majority-voted recommendation, those members in the minority may provide a minority supported counter-recommendation to the LMA Parties.

vi. In the event of an irresolvable disagreement over a recommendation or technical issue, as reflected by split decision of a quorum of the AMWG members, the LMA Parties may request, and must be provided with, a summary assessment and opinion statement by each equal portion of the AMWG membership. The LMA Parties will retain sole authority over how or if a response to the split opinion will be provided.

f. Process for responding when thresholds are exceeded

- Adaptive Management is by definition the use of newly acquired data and knowledge to improve the management of the resource in question—in this case, the operation of the Hatchery as a means of achieving the AMWG Vision. As such, it is important to establish clear, quantitative data triggers or thresholds of impact that provide for consideration of changes to operations. The Adaptive Management Plan establishes specific primary statistical thresholds for results associated with each of the five AMP Key Uncertainties. The goal of the thresholds is to provide for an objective, quantitative, decision point for use by the TWG and the AMWG to prompt response actions to unusual or undesirable hatchery-generated outcomes. These thresholds are intended to be reviewed during the period prior to implementation and periodically thereafter as information is gathered to ensure that they are set appropriately. It is of great importance that the AMWG and TWG consider these thresholds in their deliberations about research, monitoring, and any potential operational changes to the hatchery that may come from threshold exceedance and the implications thereof in the adaptive management process. Section 4.8 of the

AMP delineates the process by which the TWG and AMWG will consider and respond to threshold.

- The Adaptive Management Plan establishes specific primary statistical thresholds for results associated with each of the five AMP Key Uncertainties. The goal of the thresholds is to provide for an objective, quantitative, decision point for use by the TWG and the AMWG to prompt response actions to unusual or undesirable hatchery-generated outcomes. It is of great importance that the TWG consider and include these thresholds in deliberations about research, monitoring, and any potential operational changes to the hatchery that may come from threshold exceedance and the implications thereof in the adaptive management process. Section 4.8 of the AMP delineates the process by which the TWG and AMWG will consider and respond to cases where thresholds are exceeded.

g. Process for making changes to the Work Group Charter/Operating Guidelines.
   - If, after some period of time, amendments or modifications to the operating guidelines of this charter are necessary, the AMWG may recommend amendments or modifications to the LMA Parties according to its normal decision making process.

3. <u>Communications</u>

a. General communication expectations
   - It is the belief of the AMWG that the process of utilizing information gathered through objective scientific inquiry to guide the operation of the Cedar Sockeye Hatchery will be best met when communications and interactions within the work group and among the work groups are highly transparent to all members.

b. External communication expectations
   - In the course of executing the research and monitoring program for the AMP, AMWG members will likely hold conversations with scientists and peers from various other organizations, including the ISA. In addition to any ad hoc joint meetings planned, the AMWG and TWG will also participate in a regular joint scientific review workshop that will be open to the public, for a review and discussion of the status of the research and monitoring activities as well as the operational activities that derive from implementation of the AMP.

c. Communications with TWG
   i. The AMWG is expected to communicate both formally and informally with the TWG in the process of implementing the AMP. Requests for technical issue, research, or monitoring discussion by the TWG will be made through a formal request by the AMWG as described immediately below. Informal dialogue between individual members of the work groups is very important to building shared understandings and debating important

technical issues in the AMP process. This type of discussion between members should foster mutual collaboration between the work groups.

ii. However, it is the duty of individuals in both work groups to elevate conversations that have potential bearing on the development or evaluation of LMA Party recommendations to AMWG Chair and TWG Scientific Coordinator. It is the responsibility of the AMWG Chair and the Scientific Coordinator to provide both work groups with sufficient notice and information about the topics of discussion that bear directly on the development of recommendations by the TWG. All AMWG recommendations (and counter-recommendations should they exist) to the LMA Parties will be communicated to the TWG at the time they are provided to the LMA Parties. Also, should the AMWG opt to forgo a recommendation by the TWG, the AMWG will promptly communicate that decision back to the TWG.

iii. When a topic of scientific interest is to be discussed for potential recommendation of hatchery management actions to the LMA Parties, that topic will be formally discussed with the TWG prior to the submission of an AMWG recommendation to the LMA Parties. The protocol for this process will be a written request for consideration of an issue from the Chair of the AMWG to the TWG via the Scientific Coordinator. The Scientific Coordinator will then be responsible for planning for timely discussion of the issue on the TWG regular meeting agenda.

iv. The TWG will provide written and verbal information to the AMWG on a periodic basis regarding research and monitoring topics. The TWG will provide the AMWG with at least one formal summary science report on an annual basis, that describes the data collection, analysis and results information related to the AMP process for that year. The annual report is to be a component of the annually updated AMP Research Plan as described in Section 5d. below. The TWG will work with the AMWG to develop a mutually agreed format for the annually updated summary report and Research Plan.

d. Communications with LMA Parties
e. Communications with ISA
   - The primary role of the ISA is to provide the AMWG with an independent technical assessment resource for improving the AMWG's ability to evaluate scientific issues and/or recommendations and feedback from the TWG. There may be times, however, when a member of the TWG wishes to consult one or more of their peers on a technical issue. In general, this communication is expected and encouraged. However, at times when the AMWG is actively consulting members of the ISA on a TWG recommendation, the TWG member(s) will notify the AMWG Chair when any direct communication with any of those ISA members occurs..

f. Communications with SPU and Hatchery Management

i. The AMWG and the TWG, will frequently interact with SPU and the Hatchery Manager in the process of developing recommended activities in hatchery operations. It is intended that the AMWG should have direct access through the AMWG Chair to communicate with the hatchery manager in developing information and recommendations related to the AMP process.

ii. Any actual requests of the hatchery managers for operational or monitoring activities will be made in the form of recommendations from the AMWG.

4. Public Involvement in Adaptive Management Process

a. Public input process

i. It is an important part of the scientific process for the hatchery that it be open and visible to the public. Most public input and comment to the AMP process will be made via the AMWG. As described in Section 2d. above, all regularly scheduled meetings of the AMWG will be open to the public and will include on the agenda, an opportunity for public input.

ii. Any public comments or inquiries made directly to the TWG will be routed to the AMWG for official, formal public response.

b. Public Outreach

- It is important to the transparency of the AMP process that the public be given opportunity to share in the learning that is desired in the adaptive management of the hatchery. The AMWG will develop a public information and outreach strategy, so that the AMWG provides sufficiently detailed technical information to the public at large regarding the AMP and the work of the TWG. The primary vehicle for this technical reporting will be provided by a regular joint scientific review workshop.

5. Work Planning

a. Pre-hatchery workplan

i. The major focus for the AMWG in advance of the start of hatchery production to commence in Fall 2011, will be:

(1) Review and update of the 2006 approved Adaptive Management Plan (AMP)

(2) Oversight and direction to the TWG in their development of an existing information/data collection project.

(3) Oversight and support for the TWG development of a data and information management and storage strategy

(4) Review and timely response to the TWG recommendations for prioritization of monitoring and research needs from key uncertainties described in AMP.

(5) Preparation of recommendations for initial research and data collection activities at hatchery start up in 2011, based on consideration of technical input from the TWG and other relevant information.

b. Process for developing new research inquiries
   i. The key scientific uncertainties related to the management of the hatchery are identified and well described in the AMP. However, other new or emerging issues of scientific interest or concern may arise for either the AMWG or the TWG.
      (1) The TWG will provide the AMWG with written proposals for any new research inquiries not previously approved by the AMWG or the LMA Parties, and will await direction from the AMWG before commencing any new monitoring or research.
      (2) The AMWG will provide formal requests for evaluation of new or emerging issues, and request formal recommendations from the TWG as necessary.

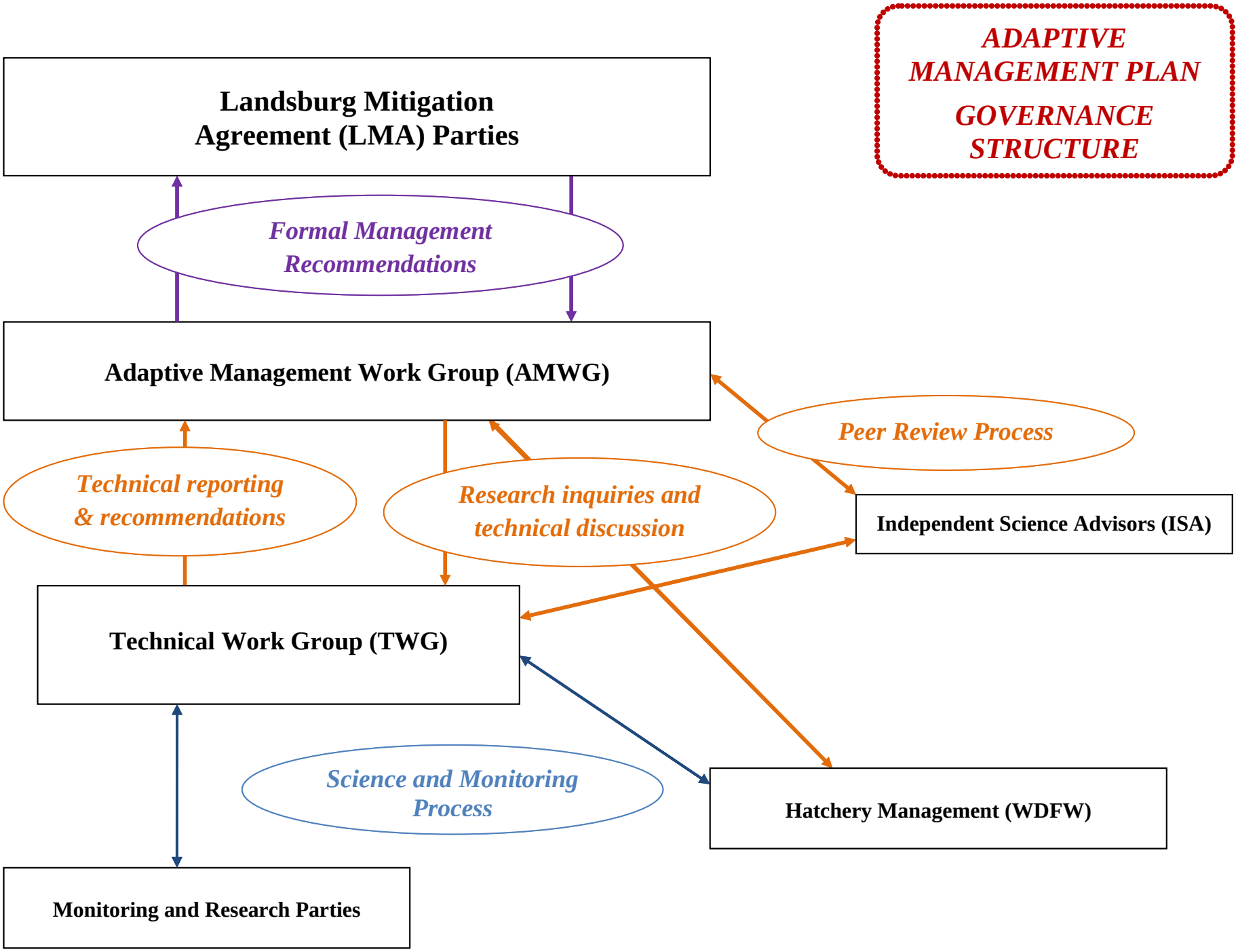
c. Annual monitoring plan
   - The AMWG will provide review, comment, and approval of the annual monitoring plan prepared and recommended by the TWG..

d. Annually updated Research Plan and Report
   - In addition to the annual monitoring plan, the AMWG is responsible for reviewing and adopting the annually updated overall Research Plan and Report directed by the TWG. The Research Plan will review the past year's activities and outcomes, and will characterize all recommended long-term study activities under the AMP process including all data collection (monitoring), research, evaluation, and recommended activities by the hatchery managers for the implementation of the AMP.

6. Funding

a. SPU support for program
   i. SPU has responsibility for the fiscal support of the AMP program. This means that in meeting its obligations under the Landsburg Mitigation Agreement, SPU will provide funding for monitoring, research, data collection, information storage and analysis leading to conclusions and possible recommendations, as required, and as available through the City's budget appropriations process.

   ii. SPU has preliminarily identified available funding for the AMP direct cost and administrative support of approximately $300,000 per year. Specific budget allocations for monitoring and scientific studies, that have been recommended by the AMWG and approved by LMA parties, as well as administrative support will be developed by SPU and provided to the AMWG and TWG for timely consideration of each year's research agenda and monitoring plan.


ADAPTIVE MANAGEMENT PLAN
GOVERNANCE STRUCTURE
Landsburg Mitigation Agreement (LMA) Parties
Formal Management Recommendations
Adaptive Management Work Group (AMWG)
Peer Review Process
Technical reporting & recommendations
Research inquiries and technical discussion
Independent Science Advisors (ISA)
Technical Work Group (TWG)
Science and Monitoring Process
Hatchery Management (WDFW)
Monitoring and Research Parties

ATTACHMENT J

SPU Agreement Number 22-048-A

CEDAR RIVER SOCKEYE HATCHERY MAINTENANCE RESPONSIBILITY ASSIGNMENT TABLE

E=ELECTRICAL, TRAN=SPU TRANSMISSIONS, SPU O=OTHER LEAD CRAFT, IT=SPU IT, SPU CO=CONTRACT OUT; SPU SCADA=SCADA TECHNICIANS		LMA Hatchery Budget							
MAINTENANCE RESPONSIBILITY MATRIX	Housing Occupant	WDFW	SPU E	SPU TRAN	SPU O	SPU CO	SPU ITD	SPU SCADA	Maximo Priority
RESIDENCES (Houses and Attached Garages)									
Asphalt Roof Shingles									
-Repair / Maintenance					x	x			4-8
-Moss treatment		x							N/A
-Remove leaves/small storm debris	X								N/A
-Clean gutters	X								N/A
Exterior Siding, Decks, Porches									
-Major repair / paint					x	x			4
-Clean / minor repair	X								N/A
Sectional Overhead Doors (Garage Doors)									
-Repair/maintenance			x		x	x			4
-Clean / minor repair	X								N/A
Vinyl Windows									
-Repair / replace					x	x			4
-Clean / minor repair	X								N/A
Flooring (Vinyl and Carpeting)									
-Replace						x			N/A
-Clean	X								N/A
Appliances (Stove and Hood, Refrigerator, Clothes Washers, Dish Washer, etc.)									
-Clean / minor repair	X								N/A
-Scheduling service	X								N/A
-Major repair / replace						x			N/A
Furnishings (Window Coverings)									
-Clean	x								N/A
-Repair / replace						x			N/A
Interior Finishes (Paint, other)									
-Repaint / refinish					x	x			4
-Routine cleaning/minor repair / touch-up	x								N/A
Domestic and Service Water Piping									
-Schedule repairs/maintenance	x								N/A
-Repair						x			4
Electric Water Heaters									
-Schedule repair / maintenance	x								N/A
-Repair or replace					x	x			4-8
Sanitary Waste									
-Schedule repair / maintenance	x								N/A
-Pump septic tank						x			N/A
Plumbing Fixtures									
-Routine cleaning/minor repair	x								N/A
-Schedule major repair	x								N/A

E=ELECTRICAL, TRAN=SPU TRANSMISSIONS, SPU O=OTHER LEAD CRAFT, IT=SPU IT, SPU CO=CONTRACT OUT; SPU SCADA=SCADA TECHNICIANS		LMA Hatchery Budget							
MAINTENANCE RESPONSIBILITY MATRIX	Housing Occupant	WDFW	SPU E	SPU TRAN	SPU O	SPU CO	SPU ITD	SPU SCADA	Maximo Priority
-Major repair						x			N/A
Heating and Ventilating (Furnace and Fans)									
-Replace filters/minor repairs to vents, etc.	x								N/A
-Schedule service / repair	x								N/A
-Major repair					x	x			4-8
Electrical Panels (repair)			x			x			4-8
Interior and Exterior Lighting									
-Repair			x			x			4
- Replace bulbs	x	x							N/A
Fire Alarms									
-Schedule repair		x							N/A
-Replace smoke detectors		x							N/A
-Change smoke-detector batteries	x								N/A
-Major repairs			x			x			4-9
-Fire Extinguishers	X								N/A
Hatchery Flow and SCADA Alarms (SPU installed)									
-Sensor repairs								x	
-Preventative Maintenance								x	
-Software updates								x	
Hatchery Flow Alarms (WDFW installed)									
-Schedule repair		X							
-Maintenance or replacement		x							
Communication Lines (Phone, Cable, Security Gate Controls and Intercoms)									
-Install telephone handset	x								N/A
-Maintain security gate controls					x	x			4-9
Exterior Improvements (Trees, Shrubs, Ground Covering)									
-Normal care (mowing, weeding, pruning, etc.)	x								N/A
-Scheduling major care	x								N/A
-Remove trees and other major care					x	x			4-9
COVERED RV PARKING AREA									
Metal Roof Panels									
-Repair / replace					x	x			4-8
-Clean / minor repair		x							N/A
Domestic and Service Water Piping									
-Schedule repair		x							N/A
-Repair						x			N
Lighting Control Devices									
-Schedule repair		x							N/A
-Repair / maintenance			x			x			4-8
Enclosed Switches and Circuit Breakers			x						4-9
Exterior Lighting									
-Repair			x						4-8

E=ELECTRICAL, TRAN=SPU TRANSMISSIONS, SPU O=OTHER LEAD CRAFT, IT=SPU IT, SPU CO=CONTRACT OUT; SPU SCADA=SCADA TECHNICIANS		LMA Hatchery Budget							
MAINTENANCE RESPONSIBILITY MATRIX	Housing Occupant	WDFW	SPU E	SPU TRAN	SPU O	SPU CO	SPU ITD	SPU SCADA	Maximo Priority
-Replace bulbs accessible with small ladder		x							N/A
-Replace street lamp bulbs			x						4-8
Sanitary Waste									
-Schedule repair		x							N/A
- Repair						x			N/A
LARGE GARAGE AND STORAGE BUILDING									
Metal Roof Panels									
-Repair / replace					x	x			4-8
-Clean / minor repair		x							N/A
Siding									
-Repair / paint					x	x			4
-Clean / minor repair		x							N/A
Sectional Overhead Doors									
-Repair / maintenance			x		x	x			4
-Clean / minor repair		x							N/A
Vinyl Windows									
-Repair / replace					x	x			4
-Clean / minor repair		x							N/A
Interior Lighting									
-Repair			x			x			4
- Replace bulbs		x							N/A
Exterior Lighting									
-Repair			x						4
-Replace bulbs accessible with small ladder		x							N/A
Enclosed Switches and Circuit Breakers			x						4-9
Exterior Improvements Including:									
Planting Trees, Shrubs, Groundcovers, Gravel Path, Asphalt									
-Normal care (mowing, weeding, pruning)		x							N/A
-Scheduling major care		x							N/A
-Remove trees					x	x			4-9
HATCHERY BUILDING									
Metal Roof Panels									
-Repair / replace					x	x			4-8
-Clean / minor repair		x							N/A
Siding									
-Repair / paint					x	x			4
-Clean / minor repair		x							N/A
Overhead Coiling Doors									
-Repair / maintenance			x		x	x			4
-Clean / minor repair		x							N/A
Vinyl Windows									
-Repair / replace					x	x			4
-Clean / minor repair		x							N/A
Floor Coverings (Vinyl, Tile, Carpet)									
-Replace / repair						x			N/A

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MAINTENANCE RESPONSIBILITY MATRIX	Housing Occupant	WDFW	SPU E	SPU TRAN	SPU O	SPU CO	SPU ITD	SPU SCADA	Maximo Priority
-Scheduling carpet cleaning or repair		x				x			N/A
-Clean carpets		x				x			N/A
Appliances									
-Clean / minor repair		x				x			N/A
-Scheduling service or replacement		x							N/A
-Major repair / replace						x			N/A
Fume Hoods									
-Cleaning / minor repair		x							N/A
-Scheduling repair		x							N/A
-Repair / replace			x		x	x			4
Circular Tanks									
-Tank water alarms		x							
-Tank Repairs		X							
-Tank plumbing installed by WDFW		X							
Furnishings (Window Coverings, Desks, Chairs, Tables)		x				x			N/A
Fire Suppression Piping (test, repair, replace)						x			4
-Fire Extinguishers				X					8
Plumbing Including:									
Motors			x						4-9
Meters and Gages					x			x	4-8
General-Duty Valves				x					4-9
System Valves				x					4-9
Heating Cables			x						4-8
Domestic and Service Water Piping					x	x			4
Pumps			x	x					4-9
Potable-Water Storage Tanks						x			4
Sanitary Waste and Vent Piping						x			N/A
-Scheduling service		x							N/A
Electric Water Heaters									
-Schedule repair / maintenance		x							N/A
-Repair or replace			x		x	x			4-8
Plumbing Fixtures									
-Minor repair		x							N/A
-Schedule repair		x							N/A
-Major repair					x	x			4-8
Plumbing Specialties									
Emergency Plumbing (Eye Wash and Shower)		x				x			N/A
Heating, Ventilating, and Air Conditioning (HVAC) Including:									
Motors			x						4-9
Meters and Gages					x		x		4-9
General-Duty Valves				x					4-9
Instrumentation and Controls					x	x	x		
Fuel Oil Distribution						x			N/A
Hydronic Pumps			x		x	x			4-9
Power Ventilators			x		x	x			4-8
Cast-Iron Boiler					x	x			4-9
Hydronic Heat Exchangers			x		x	x			4-9

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MAINTENANCE RESPONSIBILITY MATRIX	Housing Occupant	WDFW	SPU E	SPU TRAN	SPU O	SPU CO	SPU ITD	SPU SCADA	Maximo Priority
Chiller			x		x	x			4-9
Heat Recovery Ventilators (HRV)			x		x	x			4-9
Modular Indoor Air-Handling Units			x		x	x			4-9
Electric Duct Heaters			x			X			4-8
Wall Heaters			x			X			4-8
Propeller Unit Heaters			x			X			4-8
Electrical Including:									
Lighting Control Devices			x						4-8
Switchboards			x						4-9
Panel boards			x						4-9
Motor-Control Centers			x						4-9
Fuses			x						4-9
Enclosed Switches and Circuit Breakers			x						4-9
Enclosed Controllers			x						4-9
Variable Frequency Controllers			x						4-9
Packaged Engine Generators			x		x	x			4-9
Transfer Switches			x						4-9
Interior Lighting			x						4-8
-Repairs			x						4-8
-Replace bulbs, minor repairs		x							N/A
Exterior Lighting									
-Repairs			x						4-8
-Replace bulbs, minor repairs		x							N/A
Electronic Safety and Security						x			N/A
Fire Alarm						x			N/A
Exterior Improvements Including:									
Planting Trees, Shrubs, Groundcovers, Gravel Path, Asphalt									N/A
-Normal care (mowing, weeding, pruning, etc.)		x							N/A
-Scheduling and major care (e.g. tree service, asphalt repair, etc.)		x			x	x			4-9
Utilities									
Manholes, Catch Basins and Inlets					x				4-8
Process Integration Including:									
Basic Instrumentation Requirements installed by SPU, including:									
Flow Measurement								X	4-8
Level Measurement								X	4-8
Programmable Logic Controllers						x		X	4-9
Control Panels and Consoles			x			x		X	4-9
Spare Parts								X	N/A
Software Services								x	N/A
WDFW-installed instrumentation		x							
Communication Lines (Phone, Cable, Security Gate Controls and Intercoms)						x	x		4-9
Security camera and computers					X				

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MAINTENANCE RESPONSIBILITY MATRIX	Housing Occupant	WDFW	SPU E	SPU TRAN	SPU O	SPU CO	SPU ITD	SPU SCADA	Maximo Priority
SPAWNING BUILDING WITH PONDS									
Metal Roof Panels									
-Repairs					x	x			4-8
-Cleaning, minor repairs		x							N/A
Siding									
-Repairs					x	x			4
-Cleaning, minor repairs		x							N/A
Overhead Coiling Doors									
-Repair / maintenance					x	x			4
-Cleaning, minor repairs		x							N/A
Vinyl Windows									
-Repairs					x	x			4
-Cleaning, minor repairs		x							N/A
Appliances									
-Cleaning, minor repairs		x				x			N/A
-Scheduling service		x							N/A
-Repair or replace					x	x			N/A
Fume Hoods									
-Cleaning, minor repairs		x							N/A
-Scheduling service or replacement		x							N/A
Plumbing Including:									
Motors (i.e., Crowder, conveyor)			x						4-9
Meters and Gages					x				4-8
General-Duty Valves				x					4-9
System Valves				x					4-9
Heating Cables			x						4-8
Domestic and Service Water Piping					x	x			4
-Winterizing		x	x						4
Pumps			x						4-9
Electric Water Heaters			x						4-8
Plumbing Fixtures					x	x			N/A
Plumbing Specialties					x	x			N/A
Heating, Ventilating, and Air Conditioning (HVAC) Including:									
Modular Indoor Air-Handling Units			x		x	x			
Electrical Including:									
Lighting Control Devices			x						4-8
Enclosed Switches and Circuit Breakers			x						4-9
Enclosed Controllers			x						4-9
Interior Lighting			x						4-8
-Other Repairs			x						4-9
-Replace bulbs		x							N/A
Exterior Lighting									
-Replace bulbs		x							N/A
Exterior Improvements Including:									
Planting Trees, Shrubs, Groundcovers, Gravel Path, Asphalt					x	x			N/A

E=ELECTRICAL, TRAN=SPU TRANSMISSIONS, SPU O=OTHER LEAD CRAFT, IT=SPU IT, SPU CO=CONTRACT OUT; SPU SCADA=SCADA TECHNICIANS		LMA Hatchery Budget							
MAINTENANCE RESPONSIBILITY MATRIX	Housing Occupant	WDFW	SPU E	SPU TRAN	SPU O	SPU CO	SPU ITD	SPU SCADA	Maximo Priority
-Normal care (mowing, weeding, pruning, etc.)		x							N/A
-Scheduling major care (e.g. tree service, asphalt repair, etc.)		x							N/A
Utilities									
Manholes, Catch Basins and Inlets				x	x	x			4-8
Process Integration, Basic Instrumentation Requirements Including:									
Flow Measurement		x			x	x		X	4-8
Level Measurement		x			x	x		x	4-8
Communication Lines (Phone or Intercoms)					x	x			
Fire Suppression (River Water Pump Station) Including:									
Motors			x						4-9
Electric Heating Cables			x						4-9
Fire Suppression Piping					x	x			4-9
Electric Drive Vertical-Turbine Fire Pumps			x						4-9
DOMESTIC WATER SUPPLY SYSTEM									
Plumbing Including:									
Motors			x		x	x			4-9
Meters and Gages									4-8
General-Duty Valves				x					4-9
System Valves				x					4-9
Heating Cables			x						4-8
Pumps				x	x	x			4-9
Electrical (all activity)			x						
Basic Instrumentation Requirements Including:									
Flow Measurement		x	x		x	x		X	
Level Measurement		x	x		x	x		X	
Programmable Logic Controllers			x			x		X	
Control Panels and Consoles			x			x		x	
Software Services								x	
SPRING WATER SUPPLY SYSTEM									
Plumbing Including:									
Motors			x		x	x			4-9
Meters and Gages									4-8
General-Duty Valves				x					4-9
System Valves				x					4-9
Heating Cables			x						4-8
Pumps				x	x	x			4-9
Electrical Including:									
Lighting Control Devices			x						4-9
Switchboards			x						4-9
Panel boards			x						4-9
Motor-Control Centers			x						4-9
Fuses			x						4-9
Enclosed Switches and Circuit Breakers			x						4-9
Enclosed Controllers			x						4-9

E=ELECTRICAL, TRAN=SPU TRANSMISSIONS, SPU O=OTHER LEAD CRAFT, IT=SPU IT, SPU CO=CONTRACT OUT; SPU SCADA=SCADA TECHNICIANS		LMA Hatchery Budget							
MAINTENANCE RESPONSIBILITY MATRIX	Housing Occupant	WDFW	SPU E	SPU TRAN	SPU O	SPU CO	SPU ITD	SPU SCADA	Maximo Priority
Variable Frequency Controllers			x						4-9
Packaged Engine Generators			x		x	x			4-9
Transfer Switches			x						4-9
Exterior Lighting			x						4-9
Basic Instrumentation Requirements Including:									
Flow Measurement		x	x		x	x		X	4-8
Level Measurement		x	x		x	x		X	4-8
Programmable Logic Controllers			x			x		X	4-9
Control Panels and Consoles			x			x		x	4-9
Software Services								x	N/A
BROODSTOCK COLLECTION FACILITY - RENTON									
Security									
Fencing					X				
Security camera and computer					X				
Security personnel		x							
Plumbing Including:									
Meters and Gages					x				4-8
General-Duty Valves				x	x	x			4-8
Heating Cables			x						4-8
Electrical Including:									
Lighting Control Devices			x						4-8
Switchboards			x						4-8
Panel boards			x						4-8
Fuses			x						4-8
Enclosed Switches and Circuit Breakers			x						4-8
Enclosed Controllers			x						4-8
Transfer Switches			x						4-8
Exterior Lighting			x						4-8
Exterior Improvements Including:									
Planting Trees, Shrubs, Groundcovers, Gravel Path, Asphalt		x			x	x			N/A
GENERAL									
Packaged Engine Generators			x		x	x			4-9
Security Gates, Lights, Cameras					x				N/A
Spare Parts (Inventory Control)					x				

Work Management Systems

1. **Process Title:** **'Priority Codes'** Value List
2. **Process Scope:** The Priority Codes are to be used in any work order created.
3. **Responsibility:** It is the responsibility of the work order creator to place the correct Priority Code with the correct type of work.
4. **Training/Needs:** Maximo Training and Maximo access
5. **Assumptions:** Every work order will have a current Priority Codes posted on the work order.
6. **Process:** The Priority Code is the classification which defines a work orders' urgency. Response times are listed for Emergency and Urgent priorities. These times need to be supported. The following list identifies the codes and the understanding of the priority.

Priority	Category	Description
9	Emergency	Work in response to hazardous conditions (life-threatening; public health or safety threat, property damage) or critical equipment failure. • **Requires a One Hour Response time for sections of Distribution, DWW, Water Treatment, Metering** • **Requires a Two-Hour Response time for sections of Maintenance, Transmissions and Water Treatment**
8	Urgent	Work that is non-emergency, but urgent (unplanned) response is required to: minimize present or future costs, meet safety requirements, comply with regulatory requirements, and meet external customer demands. Rescheduling not possible. **Requires a 48 Hour Response time**
7	Planning	Placeholder – for Banner & InWeb WOs. These work orders are reviewed and priority changed to reflect an accurate time frame for completion.
6	Imminent	Planned work assigned to a committed schedule within **3-30 days**. The work cannot be deferred without significant customer impacts or costs. If a priority 5 and priority 6 fall on the same day the priority 6 will take priority.
5	Committed	Planned work assigned to a committed schedule that cannot be deferred without significant customer impacts or costs.
4	Targeted	Program-driven work with flexible date to be completed within 4-6 week schedule period. **Priority 4 is reserved for PM work orders.**
3	Corrective	Work is event-driven work that does not impact critical business or service processes.
2	*None*	*Is Not in use*
1	Planning Unit(Projects)	For use by Planning Unit only during Planning Phase of Projects. CIP or non-CIP projects in planning/design phase.

STATE OF WASHINGTON
DEPARTMENT OF FISH AND WILDLIFE
HATCHERIES DIVISION
28700 SE 252nd Place
Ravensdale, WA 98051

December 8, 2021

TO: **All Crew**

FROM: **Michael Sedgwick**

SUBJECT: **Stand-by Rules**

Stand-by rules are as follows:

1. The Hatchery Specialist 4 assigns stand-by.
2. Stand-by is assigned in 7-day increments: Monday 4:30 pm thru the week till the following Monday at 8:00 am 16 hours per 24 hours.
3. Stand-by is the responsibility of the person assigned for that period of stand-by.
4. The person on stand-by will answer all alarms during that period.
5. Time when turning out for an alarm is part of your work week and adjusted at the end of the next work day or at the end of the work week.
6. Any person that is not on stand-by will not turn out on alarms after work hours.
7. All stand-by changes need to be approved by the Hatchery Specialist 4.
8. When someone pulls stand-by for you the person doing the stand-by will get the stand-by pay for that time over one hour.
9. No one will pull stand-by during his or her days off.

Any questions on these rules should be brought to the attention of the Hatchery Specialist 4 for clarification. The Hatchery Specialist 4 will only make changes to the rules.

X

Michael Sedgwick
Fish Hatchery Specialist 4

X

Jordan L Tolliver
Fish Hatchery Specialist 3

X

Caleb Graham
Fish Hatchery Specialist 2

Cedar River Hatchery Stand-by Assessment By Site and Month

Date: December 8, 2021

Facility:	**Cedar Hatchery**		**Cedar Trap**			
MONTH	Type Required	Reason	Type Required	Reason	Type Required	Reason
January	**E**	**Fry**	**none**			
February	**E**	**Fry**	**none**			
March	**E**	**Fry**	**none**			
April	**E**	**Fry**	**none**			
May	**E**	**Fry**	**none**			
June	**none**		**none**			
July	**E**	**Adult**	**none**			
August	**E**	**Adult**	**none**			
September	**E**	**Inc**	**E**	**Sec**		
October	**E**	**Inc**	**E**	**Sec**		
November	**E**	**Inc**	**E**	**Sec**		
December	**E**	**Inc**	**E**	**Sec**		

(L)= Limited Response Required (45 minutes or less)
(E)= Emergency Response Required (10 minutes or less)
(LE)= Limited Emergency Response= (20 minutes or less)
none= no fish or eggs on station
Inc= incubation
Sec= Security

Response Time Criteria:

Cedar Hatchery: E designation is due to eggs/fry being in Kitoi incubators with pumped water subject to interruption due to power outages in addition to other vulnerabilities.

Cedar Trap: E designation is due to the need for 24/7 onsite security presence to discourage vandalism to the weir.

Rules:

1. Stand-by is assigned by the FHS 4
2. Stand-by shifts are 7 days in length starting on Monday at 4:30 pm and continuing until 8:00 am the following Monday.
3. The person on stand-by will respond to all alarms during their stand-by shift.
4. All changes to the normal stand-by schedule need to be documented, acknowledged in writing by all affected employees, and approved by the FHS 4.
5. If the employee on stand-by cannot resolve the cause of an alarm they are to contact people in order to solicit help in the following order:
    a. FHS 4
    b. FHS 3
    c. FHS 2
    d. Nearest co-worker who is not in leave status
    e. Any available co-worker regardless of leave status
    f. Region 4 Hatchery Operations Brodie Antipa

    Once help has been called for then proceed to Seattle Public Utilities call plan for the Cedar River Hatchery located to the right of the FHS' 4 desk on magnetic white board

Seattle Public Utilities

December 21, 2021

To: **Michael Sedgwick, WDFW Cedar River Hatchery Manager**
Jordan Tolliver, WDFW Cedar River Hatchery Assistant Manager

From: **Carol Volk, SPU Aquatic Resources Strategic Advisor**

RE: **Facility Emergency Call Plan for the Cedar River Hatchery**

Facility Emergencies

A *facility emergency* is defined here as any equipment breakdown or malfunction at the hatchery facility, including spring ponds and water pipes, and broodstock collection facility that:

-Poses a direct threat to fish life within a time period shorter than the response period. For example, if a facility emergency occurs at 3 am and fish could die in two hours, enact the emergency plan below; or

-Impacts major facility systems (e.g., water supply, boiler, HVAC system), which will cause major damage to the facility or loss of fish life.

-Poses a direct threat to the facility through flooding, fire or other destruction.

WDFW has a *Facility Emergency Action Plan (updated 12/14/2021)* that should be referenced for emergencies. The call list below is meant as a supplemental resource for quick access to phone numbers that are likely needed in an emergency but is not intended to be a replacement for any Emergency Action Plan.

For emergencies involving serious injury or threatening life or property, hatchery staff should first call 911. Then, if a facility emergency is also occurring, follow the instructions below, unless another arrangement is provided by SPU.

In the event of facility emergency, Cedar River Hatchery Management should immediately call the proper vendor for servicing of the facility (see Hatchery Service section of phone list).

Once the contact has been reached, they should provide information on next steps for hatchery staff. Hatchery staff do not need to consult SPU prior to asking for assistance in the event of an emergency.

Please have the following information available when calling for assistance:

1. Your name
2. Location or street address where the problem is occurring, for example: Cedar River Hatchery at Landsburg or Broodstock Collection Facility in Renton. If not SPU, provide street address.
3. A brief description of the issue, including:
    a. The piece of equipment that is problematic (e.g a pump at pump station 1).
    b. How that piece of equipment serves the hatchery (e.g. this pump provides spring water to our incubators).

c. What happened to cause the problem, if known (e.g., we had an electrical outage and now the pump is spinning, but at low RPMs).
d. Whether the problem is mechanical, electrical or other, if known.
e. Priority of the issue, associated with response time (e.g. ASAP). For the SPU OCC, if you are calling in a hatchery emergency, this would automatically be Priority 9, which is associated with an expected 2-hour response time. Priority 8 is associated with a 2-day response time. Priority 8 can be used in non-emergency situations.

4. Notify SPU Water Resources staff of the situation (Carol Volk, 206-498-7628) by voice or text, with relevant information about the issue, the expected repairs, and any follow up. Include information about any injuries, if relevant.
5. For any emergency, the hatchery staff should also give a courtesy call to the Landsburg Operator on duty, 206-615-1514, informing the Operator of the location of the issue and any additional site entrance or work activity that is expected to occur. As a reminder, Landsburg Operators are on duty 24h a day.

In the case of a facility emergency, Cedar River Hatchery Management shall appropriately retain or call in WDFW hatchery staff to assist in repair damaged equipment, rescue fish or conduct other tasks, even if this would require overtime pay to those staff members.

Power and Communication Loss

In the case of power failures, phone or email outages, hatchery staff shall notify the following people by voice, email or text message after the initial emergency has been attended to. For a power loss, in most cases the generator backups should kick on until shore power has been restored. See the *LOC Generator SOP* for additional information on the hatchery generator backup.

SPU Electricians are the only personnel that are allowed to open electrical cabinets or flip breakers in any SPU facility. This is for the safety and concern of all SPU staff, contractors, and vendors.

If normal communication pathways (e.g. phone) are down or reinstated, please utilize personal cell phone numbers to get in touch.

SPU CONTACT:
Carol Volk 206-498-7628
Michele Koehler (backup) 206-853-4166

Non-Emergency Facility Problems

In the case of non-emergency facility issues, please refer to the SPU/WDFW MOA Attachment J, Maintenance Responsibility Table for overall hatchery maintenance responsibilities. Although SPU technicians and contacts are included in the Hatchery System Maintenance phone list, the contacts below should be the first to contact these individuals for requesting non-emergency support.

SPU CONTACT:
Carol Volk 206-498-7628
Michele Koehler (backup)

Chemical Spills 206-853-4166

In the case of chemical spills, follow the *Cedar River Hatchery Spill Response Plan*. All incidences should be reported to the contacts below after the emergency has been attended to, if they haven't been informed through the Spill Response Plan process.

SPU CONTACT:
SPU Spill Response Team: 206-386-4166 (working hours), otherwise the SPU ORC (206-386-1800)
Carol Volk 206-498-7628

Fish Emergencies

Cedar River Hatchery on-site (eggs, fry and adults):

WDFW handles the first response for fish emergencies. The *Emergency Action Plan for a Low Water Event* includes additional guidance for risk and reporting.

Weir:

SOCKEYE:

Any unexpected adult sockeye loss in or around the trap should be reported per WDFW daily reporting procedures and SPU contacted:

SPU CONTACT:
Carol Volk 206-498-7628
Michele Koehler (backup) 206-853-4166

CHINOOK:

ALL Chinook mortalities must be reported to WDFW and SPU. WDFW is responsible for reporting mortalities to NOAA Representatives. All Chinook mortalities must also be reported to the following, as per the *Annual Weir Operating Guidelines (updated annually through AMWG)*:

CONTACT:
Carol Volk SPU 206-498-7628
AMWG (Michael S. or Carol can send this information)
Karl Burton SPU 206-684-5928
Eric Warner MIT 253-876-3125 or 206-383-4147
Aaron Bosworth WDFW 425-775-1311 x102 or 425-736-5618
Michael Sedgwick WDFW 425-432-3478
Jim Bower King County 206-477-8362
Mary Bhuthimethee NOAA 206-526-4489

Emergency Contact List

ORGANIZATION	PHONE NUMBER	TYPE OF EMERGENCY OR SERVICE
ANY SAFETY EMERGENCY	**911**	
King County Sheriff	206-296-3883	Law enforcement for Landsburg area non-emergency
SPU Security 24 hour hotline	206-733-9300	Unauthorized personnel, trespassing, theft or vandalism, threats to diminish capacity of a facility
Operations Response Center	206-386-1800	Staffed 24/7 and can assist with SPU emergency response related to pipes, valves, or physical security.
Puget Sound Regional Fire Authority	253-856-4400	Fire emergencies, annual inspections, loss of fire pump, confined space entry
PSE Emergency	888-225-5773	Power outage, line or pole issue.
Watershed Protection (Cedar Falls)	206-253-1510 x4	Trespassing issue in Landsburg area. ORC should also be called.
SPU Control Center	206-386-1818	Generators/Power outage Security/gate issues SCADA system Request on-call maintenance from security, crew, specify generator/electrical assistance
CenturyLink	800-954-1211	Phone lines and Internet
Johnson Controls	888-746-7539	Fire alarms, fire panels
Smith Fire Systems		Specific fire system maintenance
SPU Charles Street	206-386-1162 (between 7 am and midnight)	SPU VEHICLES ONLY: breakdown or roadside assistance Request fleet/vehicle assistance, providing vehicle #.
SPU Vehicle accident	Call 911	Follow directions on accident forms in glove box. Wait for police to arrive onsite before leaving the scene of an accident. Provide paperwork to SPU ASAP.

Hatchery System Maintenance

ORGANIZATION	PHONE NUMBER	TYPE OF EMERGENCY OR SERVICE
Key Mechanical	253-872-7392	HVAC System
Trane	425-586-1648	Boiler, chiller, heat exchanger
SPU Control Center	206-386-1818	Process water supply, pumps, pipes, valves generators/power outage, security/gate issues, SCADA system Request on-call team that issue involves.
Auburn Mechanical	253-833-9780	Domestic water supply: valves, pipes, etc
FloHawks	253-205-0706	Domestic plumbing: septic system, backups, etc
Herc Rentals (Fife)	253-922-3852	Spring Pond Rental Pump
Northwest Cascade	1-800-444-2371 425-449-9678 (Boyd)	Honeybucket service
Cedar Grove compost	877-994-4466	Fish carcass composting bin
Totem Pacific	509-924-4000	Salt order
Mountain Mist	800-232-7332	Bottled water replacements

SPU Contacts

ORGANIZATION	PHONE NUMBER	TITLE/RESPONSIBILITY
Landsburg Operations Center	206-615-1514	Landsburg Diversion Dam Operations
Landsburg Crew Chief (Helen Westphal)	206-615-1272	Landsburg Crew Chief
Carol Volk	206-498-7628	Landsburg Mitigation
Michele Koehler	206-853-4166	Aquatic Resources Manager
Ulysses Hillard	206-669-5439	Senior Engineer
Julia Unrein	206-496-9016	Fish Passage /Fish Biologist
Ray Brown	206-233-1525 (o) 206-396-4382 (c)	Watershed Operations (e.g. watershed road maintenance/access)
Al Drake	206-730-2296	Watershed mechanic
Karl Burton	425-943-0711	Fish Biologist
Ray Gower	206-890-7755	Electrician
Justin Wagner	206-399-8181	SCADA
Lynn Kirby	206-305-1268	Water Quality sampling
Robert Smart	206-512-7999	Mechanical
SPU Spill Response Team	206-386-1849	Chemical spills

WDFW Contacts

ORGANIZATION	PHONE NUMBER	TYPE OF EMERGENCY OR SERVICE
Cedar River Hatchery	**425-432-3478**	
Michael Sedgwick	425-890-6359	Hatchery Manager
Jordan Tolliver	425-577-2686	Assistant Hatchery Manager
WDFW main	**360-902-2700**	
Region 4 (Mill Creek Office)	425-775-1311	Regional headquarters
Aaron Bosworth	425-775-1311 x 102	or 425-736-5618 Regional Biologist
Peter Lisi	206-359-0470	Lake Washington/Cedar River Biologist
Jed Varney, DVM	360-522-2830	Cedar River Fish Pathologist/WDFW fish health
Tim Kuzan	360-789-7164	Region Pathologist
Brodie Antipa Office (Soos Hatchery)	253-931-3928	Rainier Complex Manager
Brodie Antipa Cell Phone	253-278-9523	Rainier Complex Manager
WDFW Enforcement	425-775-1311	Fish and Game officer for Cedar River Region
Edward Eleazer	425-775-1311 ext 109	Division-Level Program Supervisor
Alan Myers	425-775-1311 ext 115	Regional Captain
Brendan Brokes	425-775-1311 ext 118	Regional Director
Mark Douglas	253-666-2757	Deputy State agency Liaison to Emergency Management Division
Duty Officer	800-258-5990	State Emergency Operations Center@ Camp Murray

Trap Site Contacts/Reporting

Renton Police	425-235-2600	Law Enforcement for weir trap site non-emergency
Steve Brown	425-766-6190	City of Renton Parks Maintenance
Mary Bhuthimethee	206-526-4489	NOAA
Eric Warner	253-876-3125 or 206-383-4147	MIT
Jim Bower	206-477-8362	King County
Dan Lantz	36-0790-1419	King County (flooding contact)

LANDSBURG FISH HATCHERY

Spill Response Plan

Contact Information:
Hatchery Main Line, 425-432-3478

WDFW Mobile Phone Numbers
Michael Sedgwick, Hatchery Manager 425-890-6359 (mobile)
Jordan Tolliver, Asst. Hatchery Manager 425-577-2686 (mobile)
WDFW Safety Officer 425-432-3478
SPU Phone Numbers
Carol Volk, 206-386-1990 or 206-498-7628 (mobile)
Michele Koehler, 206-733-9447 or 206-853-4166 (mobile)
Ulysses Hillard, 206-386-1518 or 206-669-5439 (mobile)
Landsburg Operations Control Room, 206-615-1514
Cedar Falls Main Control, 206-233-1524
SPU Operations Response Center, 206-386-1800 (Staffed 24/7) for Spill Response

Address: 28700 SE 252nd Place, Ravensdale, WA 98051

Site Discharge Locations:

- ❑ Main Hatchery Room - Cedar River Outfalls. Depending on river height discharge may come from both or only one outfall. (See Map & As-built Drawings)
- ❑ On-site Storm Drain - Stormwater Infiltration Pits/Rock Pockets (located on road between Hatchery and River)
- ❑ Chemical Storage Room - Septic System (See As-built Drawings)
- ❑ Fuel Pad - Septic System (See As-built Drawings)
- ❑ Residences - Septic System (See Map & As-built Drawings)

Facility activities that have the potential to spill:

- ❑ Fueling & Fuel Transfer
- ❑ Loading/Unloading of Products
- ❑ Chemical transfer and Usage
- ❑ Vehicle & Equipment Operations
- ❑ Building & Equipment Maintenance

Materials Stored Onsite:

- ❑ Diesel
- ❑ Glycol
- ❑ Ovadine (Iodine)
- ❑ Parasite-S (Formalin)
- ❑ Peroxide
- ❑ Virkon

Chemical Storage Room Response Actions

Large Spills, Uncontrolled Releases or Highly Hazardous Materials

WARNING: Working with or handling spills of Parasite-S require a high level of personal protective equipment and should only be performed by trained personnel.

- ❑ Immediately alert area occupants and supervisor and evacuate the area, if necessary. Once evacuated take a headcount and ensure that all persons are accounted for.
- ❑ Contact Emergency Services by calling 911 if there is a fire, risk of fire, risk of public exposure, an uncontrolled leak or spill of hazardous material or medical attention is needed.
- ❑ For uncontrolled or large spills in the Chemical Room, immediately evacuate the area and building. Stay up-wind and out of fumes or gasses.
- ❑ Notify the Landsburg Operations Center Control Room 206-615-1462 and Cedar Falls Main Office 206-233-1524 to avoid exposure to non-Hatchery Employees.
- ❑ Secure the area to prevent unintentional exposure of persons trying to enter the area. Remember there are multiple entry points into the building.
- ❑ Notify SPU Spill Response by calling 24-hour dispatch at SPU Operations Response Center, 206-386-1800
- ❑ Notify SPU Hatchery Program Support, Carol Volk or Ulysses Hillard.
- ❑ Eliminate any potential ignition sources
- ❑ If material has made it into the service drain in the chemical room:
    - Turn off the septic system pumps located at the residence building.
    - Stop the flow of wastewater to the septic system to prevent overflows. Notify residents and staff to stop use of water in the buildings.
- ❑ Continue to monitor the area/situation and expand your evacuation area if conditions worsen or change.
- ❑ If safe to do so, obtain the MSDS for the spilled material and provide it to the arriving SPU Spill Responder.

Small Spills and Incidental Releases

- ❑ If safe to do so, cover the service drain in the chemical room to reduce the possibility of contaminating the septic system.
- ❑ WDFW employees trained to work with these chemicals may be able to handle small spills without evacuating the area. WDFW personnel should have been trained on the use of the formalin spill response kit and know the limits of their PPE before attempting any spill cleanup of Parasite-S (formalin). When in doubt evacuate and call for help.
- ❑ If trained to do so don appropriate PPE and clean the spill utilizing the formalin spill kit located in the chemical room.
- ❑ If material has made it into the service drain in the chemical room:
    - Turn off the septic system pumps located at the residence building.
    - Stop the flow of wastewater to the septic system to prevent overflows. Notify residents and staff to stop use of water in the buildings.
- ❑ Dispose of spilled material and spill response supplies appropriately. Note contaminated materials will classify as a hazardous waste and should be disposed of accordingly.

- ❑ For spills that have reached an outside drain or waterway, or if you cannot handle the spill/disposal with onsite recourses, or if you otherwise need assistance. Call the 24-hour SPU Operations Response Center at 206-386-1800.

Main Hatchery Room Response Actions

Large Spills, Uncontrolled Releases or Highly Hazardous Materials

WARNING: Working with or handling spills of Parasite-S require a high level of personal protective equipment and should only be performed by trained personnel.

WARNING: the floor/trench drain enter a solids trap on the south side of the hatchery building then outfall to the river. Evacuations and cleanup efforts need to consider that spills could be effecting not only the hatchery room but these other outside areas. (See Map & As-built Figure for Locations)

- ❑ For uncontrolled or large spills in the Main Hatchery Room immediately evacuate the area and building. Stay up-wind and out of fumes or gasses. **DO NOT EVACUATE TO AREAS NEAR THE OUTFALLS OR SOLIDS INTERCEPTOR.**
- ❑ Immediately alert area occupants and supervisor, and evacuate the area, if necessary. Once evacuated take a headcount and ensure that all persons are accounted for.
- ❑ Contact Emergency Services by calling 911 if there is a fire, risk of fire, risk of public exposure, an uncontrolled leak or spill of hazardous material or medical attention is needed.
- ❑ Notify the Landsburg Operations Center Control Room 206-615-1462 and Cedar Falls Main Office 206-233-1524 to avoid exposure to non-Hatchery Employees.
- ❑ Secure the area to prevent unintentional exposure of persons trying to enter the area. Remember there are multiple entry points into the building.
- ❑ Notify SPU Spill Response by calling 24-hour dispatch at SPU Operations Response Center, 206-386-1800
- ❑ Eliminate any potential ignition sources
- ❑ If material has made it trench drains:
    - Stop or reduce the flow of water to the trenches.
    - Evacuate the areas around both outfalls and solids interceptor
    - Evacuate any persons in the water (river) downstream of the outfalls to at least the park and/or Landsburg Road River Access Area.
- ❑ Continue to monitor the area/situation and expand your evacuation area if conditions worsen or change.
- ❑ If safe to do so obtain the MSDS for the spilled material and provide it to the arriving SPU Spill Responder.

Small Spills and Incidental Releases

- ❑ WDFW employees trained to work with these chemicals may be able to handle small spills without evacuating the area. WDFW personnel should have been trained on the use of the formalin spill response kit and know the limits of their PPE before attempting any spill cleanup of Parasite-S (formalin). When in doubt evacuate and call for help.
- ❑ Obtain personal protective equipment, as appropriate to the hazards. Refer to the Material Safety Data Sheet or other references for information.
- ❑ If trained to do so don appropriate PPE and clean the spill utilizing the formalin spill kit located in the chemical room.

- Make efforts to prevent spills from entering the trench drains
- If material has made it trench drains:
    - Stop or reduce the flow of water to the trenches.
    - Evacuate the areas around both outfalls and solids interceptor
- Dispose of spilled material and spill response supplies appropriately. Note contaminated materials will classify as a hazardous waste and should be disposed of accordingly.
- Notify SPU Spill Response for spills that have reached an outside drain or waterway, or if you cannot handle the spill/disposal with onsite recourses, or if you otherwise need assistance. Call the 24-hour SPU Operations Response Center at 206-386-1800.

Mechanical Room Response Actions

Large & Small Spills (Glycol)

- Immediately alert area occupants and supervisor, and evacuate the area, if necessary. Once evacuated take a headcount and ensure that all persons are accounted for.
- Contact Emergency Services by calling 911 if there is a fire, risk of fire, risk of public exposure, an uncontrolled leak or spill of hazardous material or medical attention is needed.
- Obtain personal protective equipment, as appropriate to the hazards. Refer to the Material Safety Data Sheet or other references for information. Do not cleanup spilled materials you are not trained to handle.
- Stop source of spill (turn off equipment, upright container, plug leak, etc)
- Control small spills in place. Never use hoses to direct spills to any drains.
- Obtain the non-petroleum spill kit in the mechanical room and make efforts to prevent spills from entering the drains including:
    - Surround the spill with dry absorbent booms or pads
    - Create more than one stopping point with spill supplies
    - If possible, use the spill supplies bucket or other buckets to contain leaks
- Notify SPU Spill Response for spills that have reached an outside drain or waterway, or if you cannot handle the spill/disposal with onsite recourses, or if you otherwise need assistance. Call the 24-hour SPU Operations Response Center at 206-386-1800.
- If material has made it into the service drain in the chemical room:
    - Turn off the septic system pumps located at the residence building.
    - Stop the flow of wastewater to the septic system to prevent overflows. Notify residents and staff to stop use of water in the buildings.
- Use pads and/or granular sorbent to clean up spilled material
- Loose spill control materials should be distributed over the entire spill area, working from the outside, circling to the inside. This reduces the chance of splash or spread of the spilled chemical.
- When spilled materials have been absorbed, use brush and scoop to place materials in an appropriate container
- Remove spent pads and/or sorbent and dispose of properly.

Diesel Fuel Containment Area Response Actions

Large & Small Spills (Diesel)

Note: Diesel is a combustible liquid. Caution should be taken to eliminate ignition sources.

- ❑ Obtain personal protective equipment, as appropriate to the hazards. Refer to the Material Safety Data Sheet or other references for information. Do not cleanup spilled materials you are not trained to handle.
- ❑ Eliminate ignition sources (i.e. turn off generators, move vehicles away and do not allow smoking in the area)
- ❑ If able to, stop source of spill (turn off equipment, upright container, plug leak, etc).
- ❑ Control small spills in place. Never use hoses to direct spills to any drains.
- ❑ Obtain the petroleum (oils) spill response kit located near the fuel tank and Make efforts to contain spill to the secondary containment area.
    - **Turn off the secondary containment valve located in the small box next to the building. (Shown in the open position, photo below)**
    - If it is raining it may be necessary to cover the containment are to prevent overfilling of the secondary containment pad.
    - Surround the containment pad with dry absorbent booms or pads
- ❑ Notify SPU Spill Response for spills that have reached an outside drain or waterway, or if you cannot handle the spill/disposal with onsite recourses, or if you otherwise need assistance. Call the 24-hour SPU Operations Response Center at 206-386-1800.
- ❑ If you suspect spilled material has made it through the secondary containment valve to the septic system:
    - Turn off the septic system pumps located at the residence building.
    - Stop the flow of wastewater to the septic system to prevent overflows. Notify residents and staff to stop use of water in the buildings.
- ❑ Use pads and/or granular sorbent to clean up spilled material
- ❑ Loose spill control materials should be distributed over the entire spill area, working from the outside, circling to the inside. This reduces the chance of splash or spread of the spilled chemical.
- ❑ When spilled materials have been absorbed, use brush and **NON-SPARKING** scoop to place materials in an appropriate container
- ❑ Remove spent pads and/or sorbent and dispose of properly.

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Other Areas and Outside Spill Response Actions

Large & Small Spills

Spill Clean Up

- **Note: Spills involving Parasite-S should be handled by professional responders equipped with high levels of protective equipment. Evacuate the area of the spill trying to stay up-wind.**
- Notify the Landsburg Operations Center Control Room 206-615-1462 and Cedar Falls Main Office 206-233-1524 to avoid exposure to non-Hatchery Employees.
- Notify SPU Spill Response for spills that have reached an outside drain or waterway, or if you cannot handle the spill/disposal with onsite recourses, or if you otherwise need assistance. Call the 24-hour SPU Operations Response Center at 206-386-1800.
- Obtain personal protective equipment, as appropriate to the hazards. Refer to the Material Safety Data Sheet or other references for information. Do not cleanup spilled materials you are not trained to handle.
- Stop source of spill (upright container, plug leak, etc)
- Seal off storm drain with berms or drain cover and stop any spread of the spill.
- Protect floor drains or other means for environmental release. Spill socks and absorbents may be placed around drains, as needed.
- Use pads and/or granular sorbent to clean up spilled material
- Let pads sit on spill to absorb spilled material

Spill & Clean Up Material Disposal

- Loose spill control materials should be distributed over the entire spill area, working from the outside, circling to the inside. This reduces the chance of splash or spread of the spilled chemical.
- When spilled materials have been absorbed, use brush and scoop to place materials in an appropriate container (see flow chart)
- Remove spent pads and/or sorbent and dispose of properly (see flow chart)
- Call spill cleanup contractor

1. Main Hatchery Room
2. Chemical Room
3. Fueling Tank and Generator
4. Mechanical Room
5. Residences
6. Main Hatchery Outfall 2
7. Main Hatchery Outfall 1
8. Landsburg Operations Control Room

Landsburg Power Outage SOP

The LOC CAT generator provides backup power to the Landsburg Campus, including the hatchery and spring water pumps. When Landsburg power goes out, the LOC CAT generator should come on and provide power to the site. In most instances there should be no interruption to normal operations.

If utility power goes off and on, it is possible that some equipment may not come back on, a breaker will trip, or the power supply may not transfer to the backup.

- To ensure Landsburg campus has power:
    - Check that the dam lights, SCADA, Tainter gates, and downstream passage gates have power.
    - Call the hatchery to be sure the spring pumps have come on, providing water to the hatchery; these pumps are also backed up by the LOC generator.

      Hatchery Office: (425) 432-3478 (main office)
      Michael Sedgwick cell: (425) 890-6359
      Jordan Tolliver cell: (425) 577-2686

      Hatchery staff has been asked to contact the Landsburg Operator or Crew Chief before accessing facilities in and around the LOC.

- If there **IS** an issue with power supply call the SPU Control Center (206) 386-1818/ x61818 and request immediate assistance from an on-call electrician.

  Electricians are responsible for management of all breaker boxes and must be contacted if there is an issue with a breaker.

  Once an electrician arrives, use the Guide to Breaker Locations on page 2 of this SOP to show them the breaker boxes of concern.

- When time permits, contact Puget Sound Energy by phone or go to pse.com to report the outage and see area outages.
- If the power is out at the Tunnel House, contact PSE with the meter number (Z018600422) and the location.

- If there appears to be damage to the power lines near the Tunnel House contact Seattle City Light.

Hatchery Spring Pump Connection to LOC CAT generator

The spring pumps are powered by the LOC CAT generator and supply water to the hatchery. This water supply is critical to the survival of the adult fish, eggs and fish fry. The hatchery is at risk of fish dying without spring water (time varies between 15-45 minutes depending on the time of the year). If there is an interruption of power to the spring pumps, hatchery staff will be working to get water to fish as soon as possible, and will contact the LOC to learn more about what is happening.

Guide to Breaker Locations

Location of outage	**Breaker location**	**Details**
SCADA	LOC Electrical Room	
Dam lights	North end of Screenhouse	
Tainter gates	South end of Screenhouse	
Hatchery spring pump breaker	Old generator building	Tan building next to OTB
Downstream passage gate Screen Cleaners Aqueduct gate	PLC/Fish screen building	